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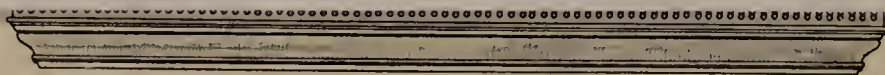
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THE
ESSEX NATURALIST:

BEING THE
Journal of the Essex Field Club,

EDITED BY
WILLIAM COLE, A.L.S., *Honorary Secretary*,
MILLER CHRISTY, F.L.S.,
and
PERCY THOMPSON, F.L.S., *Honorary Secretary*.

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"Men that undertake only one district are much more likely to advance Natural Knowledge than those that grasp at more than they can possibly be acquainted with. Every kingdom, every province, should have its own Monographer."—GILBERT WHITE, of Selborne.

"Things seen are mightier than things heard."—TENNYSON.

[The authors alone are responsible for the statements and opinions contained in their respective papers.]

Stratford, Essex:
THE ESSEX FIELD CLUB, AT THE ESSEX MUSEUM
OF NATURAL HISTORY.

1921.



“ And he spake of trees, from the cedar tree that is in Lebanon even unto the hyssop that springeth out of the wall : he spake also of beasts, and of fowl, and of creeping things, and of fishes.”

THE WISDOM OF SOLOMON. (I Kings iv. 33.)

*Flower in the crannied wall,
I pluck you out of the crannies ;—
Hold you here, root and all, in my hand,
Little flower—but if I could understand
What you are, root and all, and all in all,
I should know what God and man is.*

TENNYSON.

*Hark ! how the cheerefull birds do chaunt theyr laies
And carroll of Loves praise :
The merry Larke hir mattins sings aloft ;
The Thrush replyes ; the Mavis descant playes ;
The Ouzell shrills ; the Ruddock warbles soft ;
So goodly all agree, with sweet consent,
To this dayes merriment.*

SPENSER (“ Epithalamion.”)

*“ La gentille alouette avec son tire-lire,
Tire-lire, à lire, et tireliran, tire
Vers la voûte du ciel, puis son vol verce lieu
Vire, et désire dire adieu Dieu, adieu Dieu.”*

THE SONG OF THE SKYLARK.

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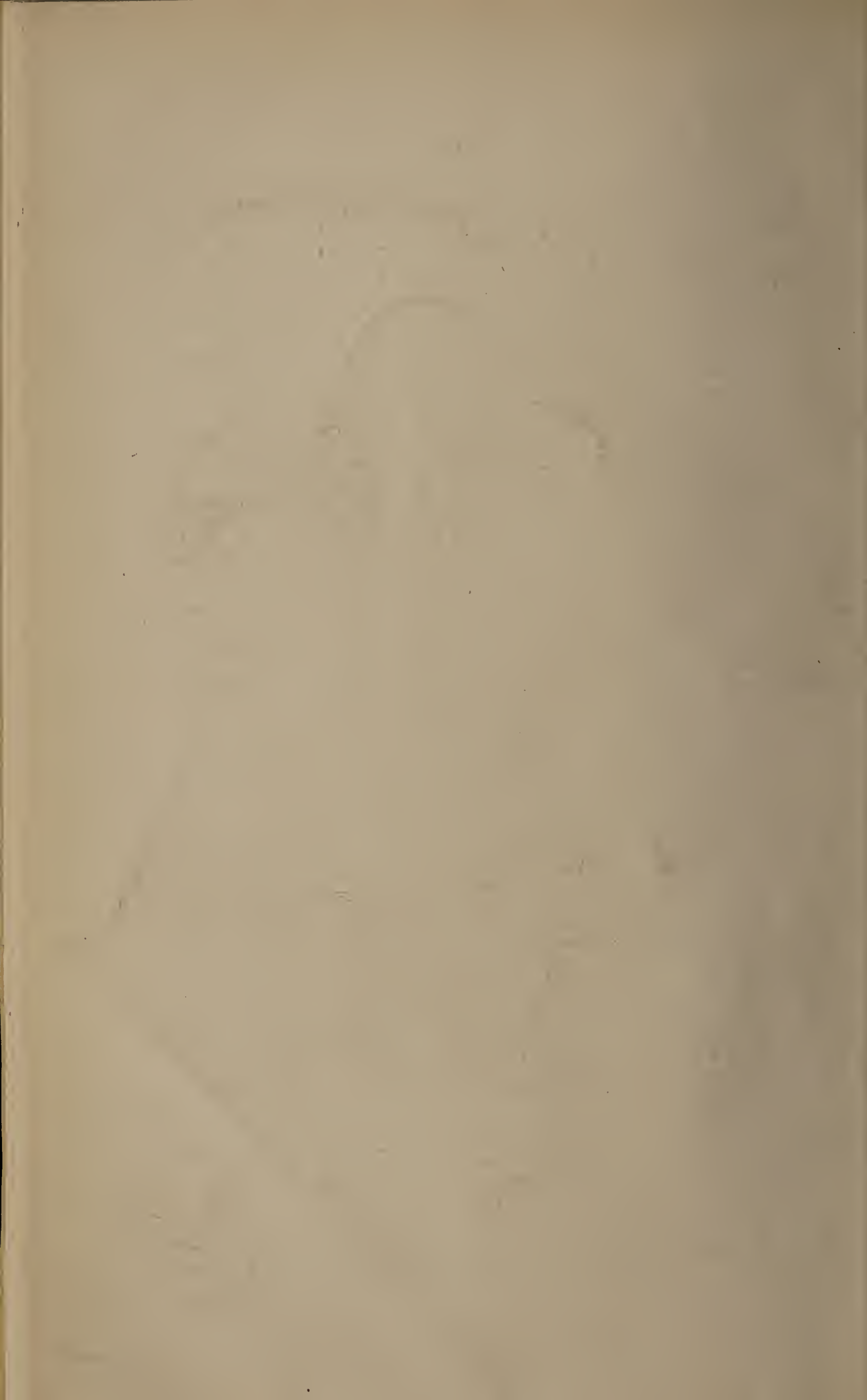
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and MILLER CHRISTY, F.L.S.

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*The Authors alone are responsible for the Statements and Opinions contained in
their respective Papers.*

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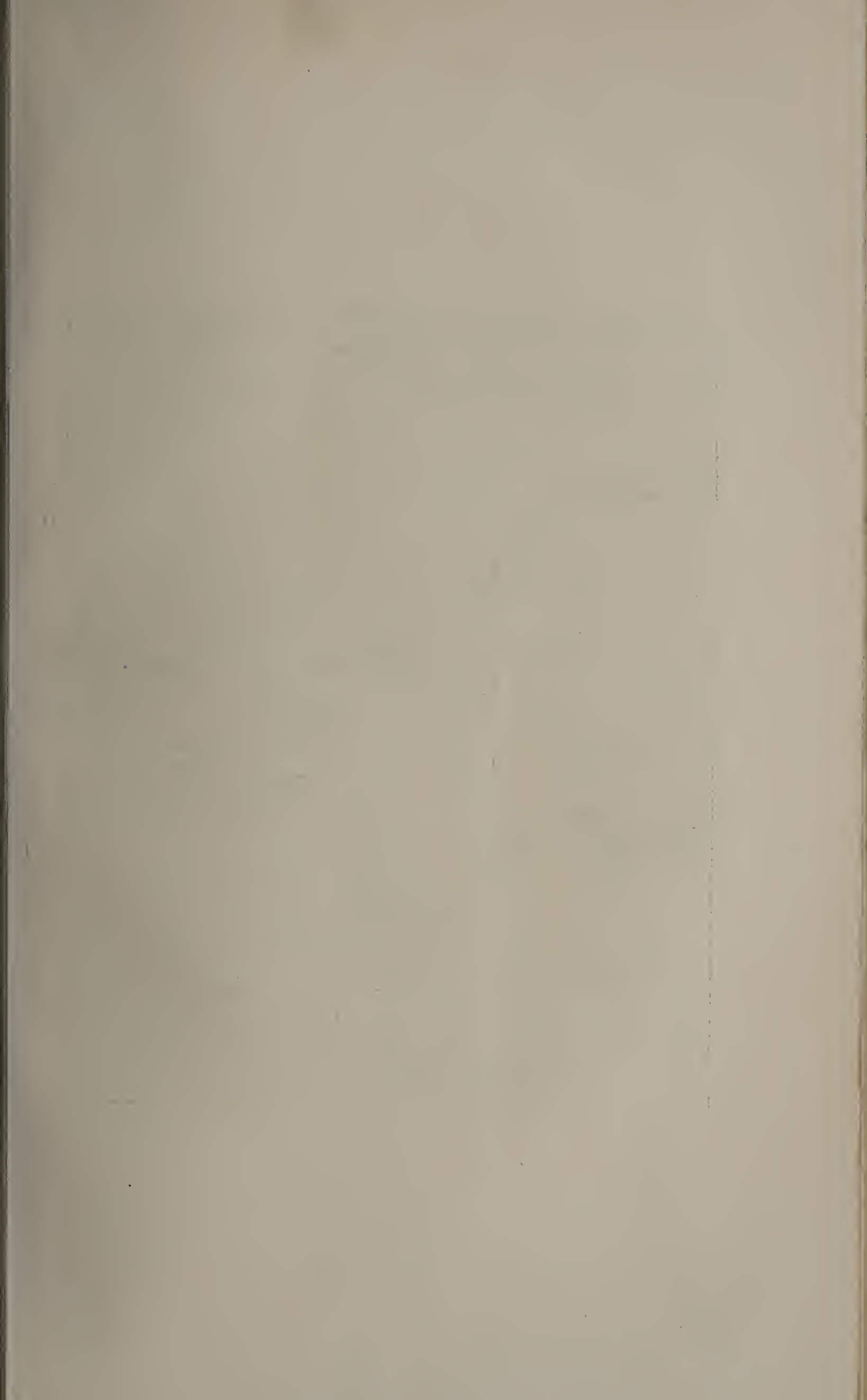
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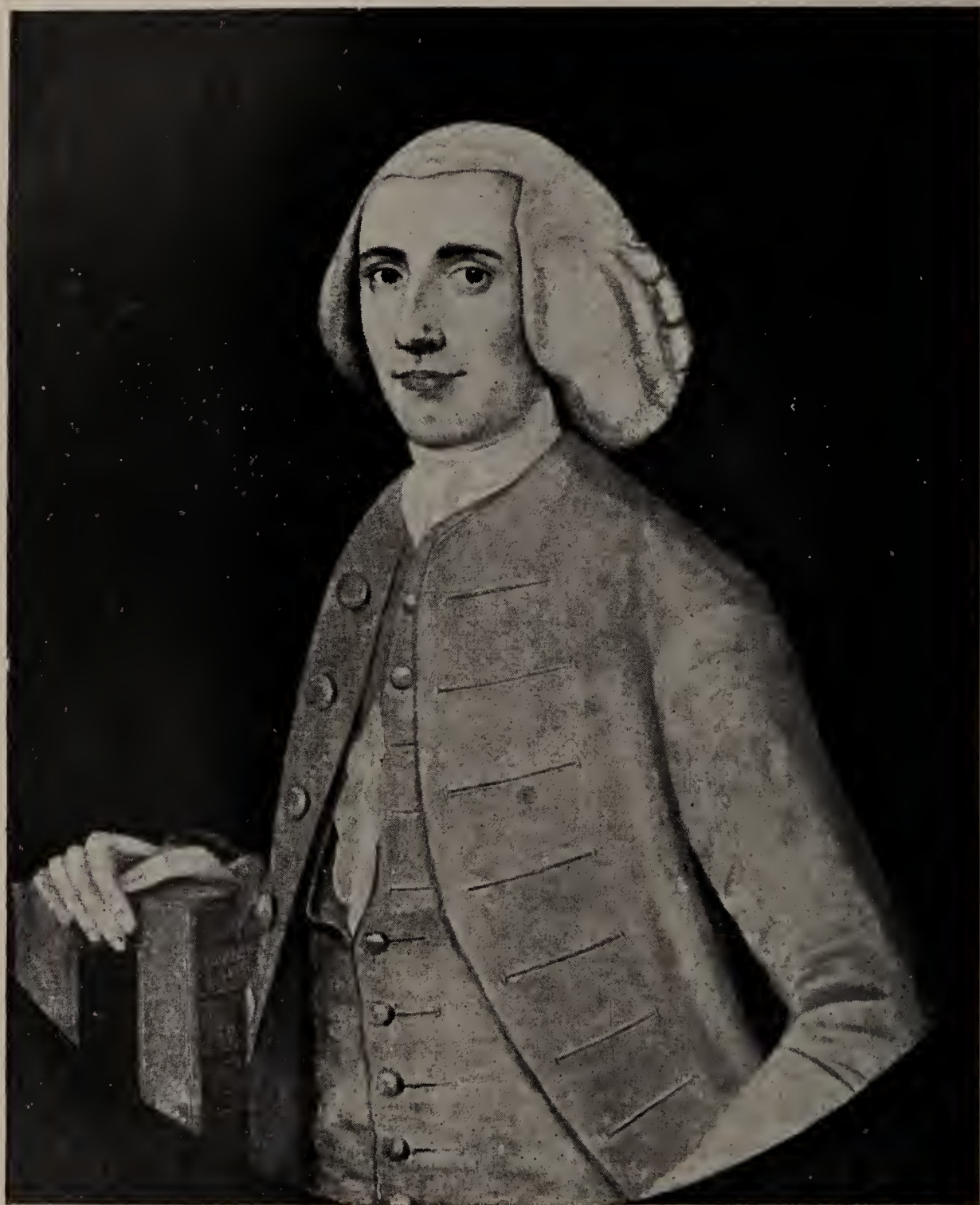
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THOMAS DALE, M.D., THE YOUNGER ? (1749-1818), OF LONDON.

THE
ESSEX NATURALIST:

BEING THE
Journal of the Essex Field Club.
VOLUME XIX.

A WHIRLWIND AND WIND-RUSH AT GOS-
FIELD ON 26th JULY 1918.

By A. C. W. LOWE, M.A., F.L.S.

(With one Illustration.)

[Read 30th November 1918.]

A FEW months ago, Mr. Miller Christy described in these pages a remarkable whirlwind and wind-rush which occurred in the parish of Writtle, on 27th October 1916, tearing violently across the face of the country for nearly five miles, causing most serious damage to thousands of trees and to scores of houses and other buildings.¹

I now describe a wind-rush, of exactly the same kind, but of smaller dimensions and less destructive effect, which occurred here (Gosfield Hall, near Halstead) at 6 p.m., G.M.T. (=7 p.m. clock time), on Friday, 26th July 1918. Such phenomena, though not of extreme rarity, are, nevertheless, very unusual; and, when they occur, their principal features should, in my opinion, always be recorded in detail and with the greatest possible accuracy." I was myself an actual witness of the progress of this particular storm for the greater part of its course. I have never before seen anything of the same nature, and I found the sight it afforded to be extremely impressive. Moreover, I have since been over the course followed by the storm and have observed carefully the effects produced by it. The more remarkable of these I have noted on the accompanying chart (*fig. 1*), copied largely from the 25-inch map of the Ordnance Survey (*xvi.*, 6 and *II*).²

¹ See *Essex Naturalist*, xvii., pp. 136-145 (1918).

² [It is fortunate that this remarkable phenomenon should have been both witnessed and described so fully by Mr. Lowe, who is a man of education and is obviously extremely observant. As a rule, in such cases, all the evidence one can get is that of uneducated country people, whose powers of observation are limited and their powers of description almost non-existent. Consequently their statements are usually more tantalising than helpful.—ED.]

I am practically certain that no barograph exists anywhere in the parish of Gosfield or sufficiently near the course of the wind-rush to be likely to be influenced by it.³ It is, therefore, now impossible to ascertain the exact atmospheric conditions which preceded, and largely induced, the storm. I am able, however, to state from my own observations that the barometer had been falling slightly all day; that, at the time of the storm, it stood at 29.47 in. (uncorrected); that the wind was from the west; that the outside temperature was 53° F.; that there had been a good deal of rain during the day, especially in the afternoon; and that the rain was accompanied by thunderstorms, a specially-violent one passing within the half-hour preceding the outbreak of the whirlwind.

So far as the evidence available goes, the whirlwind originated in a meadow just on the south-west side of the lake in the park here—that is, between the lake and the road from Gosfield to Wethersfield. At all events, there are no visible indications of its having crossed this road, which is no more than 100 yards from the point at which the storm appears to have originated. The meadow in question slopes gently, in most places, towards the lake. It is in the occupation of Mr. P. Ardley, of Harmas Farm, who, with his son, was at the water's edge at the time the whirlwind began. He tells me that it appeared to start at the spot indicated on the chart; from which point, the meadow falls slightly towards the ditch (shown) at the northern end. At once (he says) a quantity of dust and dirt appeared to have been drawn into the vortex and carried upwards, whilst a loud roaring noise became audible immediately. Mr. Ardley describes the sound as like that of an express train rushing through a station, with the engine blowing off steam violently. This tallies exactly with my own impression (for I also was within earshot), and probably describes the sound as nearly as may be done in words, though it might also be described as something between a very loud hiss and a roar. At a later stage in the progress of the storm, it emitted a sound which was such as to lead many people to believe that a very fierce fire had broken out somewhere. Mr. Ardley and his son, fearing that they might be drawn into the lake, ran up the meadow; but the rush passed them, of course, in an exceedingly short time.

³ Mr. G. Mayes, jeweller, etc., of High Street, Halstead (nearly two miles beyond the furthest point reached by the storm), has one, but it was scarcely affected.

Our lake is, I believe, by far the largest sheet of inland fresh water in the county of Essex, extending to forty-one acres. The next largest is, probably, the lake in Debden Park, which is less than half as large.

The whirlwind crossed the lake diagonally at a part at which it is comparatively narrow—not more than about 250 yards wide. At the point at which it first reached the lake, it broke a willow tree. Here the wind-rush must have been very narrow; for, although the water's edge is here lined by a number of alders, growing close together, only the one nearest to the willow shows any trace of injury.

The storm, as it crossed the lake, picked up an enormous quantity of water, which appeared like a huge column of spray in a state of violent agitation, ascending to an immense height. The suspended water was then carried off by the whirlwind, still in violent motion. Some persons who saw it and were not aware of its nature, formed the opinion that an aeroplane had been struck by lightning and was going off in a cloud of steam and smoke! As I have not heard that the water forming this column was discharged in bulk anywhere in the neighbourhood, I assume that it was dissipated gradually, though it might have fallen and been mistaken for heavy rain.

As the storm reached the further (north-east) shore of the lake, it passed over a bed of reeds, and the track it left therein affords an indication of its narrowness. This track, as viewed immediately afterwards, was no more than about 50 feet wide. Without doubt, however, the storm was really wider than this; for it must be remembered that reeds, not being rigid, will bend before a storm and afterwards recover their original positions to a large extent. It is difficult, therefore, to tell how much wider the storm may have been than the obvious track it left.

On reaching the north-east shore, the storm struck, almost at once, a Scots fir (off which it broke a branch and several smaller pieces), as well as a large elm, having a stem 16ft. in circumference, which was broken off 12ft. from the ground.

The storm, during the time it was crossing the lake or immediately afterwards, also produced two other curious effects. Thus, I observed that, for several minutes after the storm had passed, the fish in the lake were extremely agitated, and that

many of them jumped continuously above the surface of the water. I have been unable to hear, however, that any fish were carried away and found deposited anywhere on the land. Again, Mr. Ardley, after running from the edge of the lake (as stated already), stopped and looked back across to the further shore, just after the storm reached it. There he could see a white rabbit, which had been caught up by the force of the whirlwind, and he saw it deposited some distance away. Other rabbits also were affected by the violence and terrific velocity of the wind-rush; for Mr. J. Rowson, of Park Cottage, who crossed this part of the park about half-an-hour later, noticed several apparently semi-stupified.

From this point on the edge of the lake, the ground rises gently for a third of a mile or so, though the total rise in this distance is small—probably not more than twenty or twenty-five feet. This part of the park is mainly open grass-land, across which the whirlwind rushed, passing about 150 yards to the south of the mansion. Hereabouts, there are some fine trees, but they stand fairly-well apart and the storm passed between most of them, without much injuring any. Just before crossing the main drive up to the house, the storm passed one end of a temporary fence of portable iron hurdles, six of which it overthrew—this showing clearly the terrific force of the blast. Here, too, several good-sized trees were brought down, including a fine fir, 80ft. high, which was uprooted and laid to the N.W. Off other trees many branches were broken.

After crossing the drive mentioned, the storm reached and traversed a wood known as "The Grove." In this, the trees grow very densely, thus protecting one another to a large extent; for which reason, probably, the damage done was less than might have been expected. The only tree badly smashed was a very tall ash, with a stem six feet in circumference, which was broken off five feet from the ground and laid to the south-west. Yet most of the other trees, especially ashes, which grew right in the track of the storm show signs of having lost some of their smaller branches. Here, during the storm, many branches were seen to be lifted up to a great height, whirled about, and carried away by the whirlwind. Not a few were deposited in a ditch (shown) running from the north-east corner of the wood towards the Hedingham Road

Other ash branches were picked up beside the Hedingham Road (a distance of about 350 yards from the Grove), and some are believed to have been carried further. An iron hurdle, standing beside this ditch, was overthrown and a wooden post-and-rail fence was broken down. Yet it is remarkable that two large hay-stacks, just put up on the very bank of the ditch, and not yet thatched, as well as a large heap of straw laid ready for thatching, were entirely untouched, though they can hardly have been as much as ten yards from the track of the storm.

Mr. E. T. Adams, F.R.A.S., of Halstead, informs me that one of his carmen, who was on the road not far from this point whilst the storm was passing, described it to him as "a terrific rush of wind and smoke, carrying with it many small branches or twigs torn from the trees in the Grove. He thought at the time that it was a hay-stack on fire or an aeroplane coming down on fire. It appeared to leave a bluish vapour or smoke in its trail as it passed over the Hall Park in the direction of Hedingham."

After leaving the Grove, the storm reached the confines of the park, and, crossing a meadow and a field of potatoes (the ground here being approximately level), reached the road to Hedingham. Here it broke the top off a damson tree, damaged some currant bushes, and threw down an apple-tree, which it laid to the north-east. Yet a cottage, in the garden of which these trees stood, escaped injury (its thatched roof showing not the slightest evidence of disturbance), though standing within twenty-five feet of the apple tree mentioned.

Crossing the Hedingham Road, the storm (pursuing now an almost easterly direction, and the ground here rising sharply) traversed two fallow fields and a meadow, in which it has left no trace of its passage. Its course here was more or less parallel with, but converging upon, the road to Halstead, which it reached in about a quarter of a mile, near Wells Farm. The occupants, Messrs. J. and A. Fenner, inform me that, watching the storm as it approached, it seemed to be coming *directly up, and actually in*, the road, which is here below the level of the fields on either side of it. It seems probable that they are quite right; for I can see no trace of any damage done in the fields here.

Reaching Wells Farm, the storm turned up a portion (esti-

mated at half-a-ton) of a newly-made haystack, leaving it at a right-angle with its former position; swept a number of tiles off a shed; and blew (or, perhaps, sucked) the barn doors (which open outwards) inside the barn till they jammed on the floor inwards. It just missed the dwelling-house, but smashed a damson tree growing beside the road, which it here crossed into a field of beans, where a good deal of damage was done to the crop.

Here, apparently, the wind-rush stopped. The Messrs. Fenner consider that it did so, and I have been quite unable to trace further on any damage which can be attributed to it with any certainty. Assuming this to be the case, it will be found that the storm traversed a course slightly less than one mile and a half long—little more than one-quarter (that is) of the traverse of the Writtle storm. In general, its course was (like that of the Writtle storm) from south-west to north-east.

The storm was (as is usual with such storms) exceedingly narrow. Nowhere could I see any evidence that it was as much as 100ft. wide, and I believe it was even narrower in places, though it is impossible, of course, to judge its width with accuracy. There is clear evidence, however, that its edges were very sharply defined, as in the case of the Writtle storm.

At the time of the occurrence of the storm, I made no precise observations to determine its duration. I noted, however, that it was certainly very brief, and that it appeared to travel at a fairly-uniform rate. Further, I gathered from observers at the beginning and end of the course that its total time of traverse could not have exceeded ten minutes. Since then, however, I have endeavoured to estimate the duration of the storm more accurately—a very difficult thing to do, in view of the amazing rapidity with which its different phases followed one another. I took a position as near as possible to that from which I had actually viewed the storm. After noting the exact time, I imagined that I was again witnessing the successive phases of the storm, with my eyes fixed on the actual points at which I had seen them take place; and I noted the time again at the conclusion of my “reconstruction” of the storm (as the French would say). I repeated the experiment several

times ; and I found that, though there was a slight variation in the result each time, the imaginary traverse of the storm across the lake did not in any single case occupy more than 70 seconds ; or, say, one minute as a mean figure. Now, as the distance across the lake is about one-eighth of the total traverse of the storm, we may estimate that its total duration was somewhere about eight minutes. I give this estimate, of course, merely for what it may be worth ; but I believe it to be impossible now to obtain one more nearly accurate.

Unlike the larger Writtle wind-rush (which followed a course that was practically straight), this one followed a course which has in it a slight double-curve, like an extremely-elongated S. This can hardly have been due to any inequalities in the surface of the ground ; for the differences in elevation were remarkably small—probably less than twenty-five feet at any point. The ground traversed by the Writtle wind-rush was much more uneven.

The damage done by the storm was on the whole, surprisingly small. By good fortune, it nowhere touched any buildings, except the shed and barn at Wells Farm, and the injury to these was slight. It is worth noting, however, that, had the storm traversed a perfectly-straight course between its two extreme points, it would have passed exactly over or through Gosfield Hall itself, built by Sir John Wentworth about 1545, though largely altered and added to since then. In that case, it is to be feared, the very least damage that could have been expected would have been that the beautiful Tudor chimneys and the gables on the older part of the house would have been thrown down into the courtyard. Of trees, a good many were injured more or less all along the course of the storm. Probably more would have been damaged had the storm not come in the summer-time, when the sap was up and the branches were, in consequence, tougher than when dry in winter. For this reason, probably, many of the branches which were broken were left hanging ; whereas, in an ordinary winter storm, these would have been snapped off completely. The direction in which the broken-off trees fell was very various, as will be seen from the accompanying chart (*fig. 1*), on which I have recorded the falling of trees to the N.E., N., N.W., and S.W.

The storm, as it passed, gathered up and carried with it

quantity of brown dust. This seems strange in view of the fact that the ground traversed was mostly pasture and very wet, owing to the thunder-storms earlier in the day. Some of this dust was gathered, perhaps, from the ground below the trees, which were uprooted. This can hardly have been the case, however, with the dust which the Messrs. Ardley saw carried up actually *at* the place of origin of the storm and immediately after it began. The extensive transport of dust and dirt was observed also (as will be remembered) in the case of the Writtle storm.

It is curious that two of these very-striking phenomena should have occurred, no more than sixteen miles apart, within a period of no more than twenty-one months; also that both should have followed a more-or-less north-easterly course.

DISCUSSION.

Mr. F. J. W. Whipple read the following comments, written by Sir Napier Shaw, F.R.S., Chairman of the Meteorological Committee:—

“So far as I can make out, this whirl arises from some local instability in the upper air, which gives rise to a local rotation sufficiently rapid to balance a distribution of pressure with a low pressure core. This distribution of pressure is then transmitted to the surface and the air is gradually sucked out of the core and rotation set up. When the core reaches the surface, it is very bad for the surface, because the core is protected by spin, except just at the surface, and there the low pressure at the centre has to be supplied by air which passes along the surface and gets up spin as it goes. In so far as the core is *fed* at all, it is by what moves along the surface, which cannot get up enough spin to make a balance. So the arrangement becomes very like a vacuum cleaner on a large scale, with a “hose” made of air spinning so fast that it can resist the external pressure. Passing over water, the air going to the centre blows the water into spray, which is carried to the low pressure in the middle.”

“The mechanical process at the bottom is thus sufficiently evident, but the mechanism of the top is still unknown. There is something there which keeps up a suction and so maintains a low pressure along the core of the hose. The effect can be imitated by a fan-wheel in a solid lid or by a gas-jet in a tube leading from a solid lid; but nobody has yet shown how to set up a whirl of this kind when there is no lid. One can describe possible conditions that would meet the case, but cannot realise them experimentally, because one cannot work on a sufficiently-large vertical scale.”

Mr. Whipple also showed lantern-slides illustrating the damage done to buildings by a tornado in America. He invited members who were so fortunate as to have the opportunity to observe such phenomena to communicate at once with the Meteorological Office. Great interest attached to the movements of the clouds during the passage of the tornado. It

was also desirable, he said, to record the direction of rotation of the air-column. This could usually be determined after the passage of the storm by noting the way in which trees had fallen.

HORNETS, WASPS, AND FLIES SUCKING THE SAP OF TREES.

By MILLER CHRISTY, F.L.S.

[Read 30th November 1918].

BESIDE the drive leading up to my house, there are a number of fine old elms (a dozen or twenty of them altogether), which have been identified recently by Prof. M. Henry as *Ulmus glabra* Miller. That they are really large and ancient—past their prime, indeed—may be gathered from the fact that they have in them numerous holes which form the nesting-places of many birds, including White Owls, Little Owls, Kestrels, Stockdoves, Jackdaws, Starlings, and Sparrows.

For several years past, I have noticed that, every autumn, from about the middle of August to the middle of September (in short, during the ordinary wasp season), the bark on the stem of a particular *one* of these trees is infested by hornets, wasps, and many kinds of flies. The two former crowd into the deeper cracks in the bark, especially at certain spots. At these spots, groups of three or four hornets or a dozen wasps (but never the two mixed) may frequently be seen, all having their heads inwards and their tails outwards, and all apparently sucking or gnawing hard at the deepest part of the crack. The flies, on the other hand, appear seldom or never to enter the cracks, but stand around on the surface of the bark at a respectful distance from their deadly enemies the wasps. The wasps, in their turn, also keep to themselves, never mixing with the hornets, of which they appear to be in fear. No doubt they have good reason; for our member, Mr Henry Mothersole, coming up the drive one afternoon and stopping a moment to watch the assembly, saw a hornet seize three wasps, one after the other, in quick succession, biting and killing each in turn, and then throwing the body away, as if in contempt. This habit of theirs accounts largely, no doubt, for the fact that the ground immediately around the base of the tree is

strewn thickly with dead and dying wasps. Perhaps, however, the substance (whatever it is) which the wasps gather in the bottoms of the cracks has some poisonous or intoxicating effect upon them; for, whilst engaged in obtaining it, they generally appear drowsy and semi-stupified. I have never before seen so many hornets in one year as I have seen this autumn; when, on almost any day, half-a-dozen at least might be seen at a time on the trunk of this one tree. I have never seen any species of lepidoptera round the tree-trunk.

One is bound, I think, to conclude that these hornets and wasps are busy imbibing the sap of the tree, which, naturally, they can get at more easily at the bottoms of the cracks in the bark than elsewhere. But why do they seek the sap of this *one particular tree only*, and not that of any of the others? I have never seen the same assembly on any of the other trees. Again, why do they restrict their attentions to the *stem only*? for I have not seen them at work at a greater height than about ten or twelve feet, at which height the large lower branches branch out. The tree is of about the same size and height as the others, being about 85 feet high and 4 feet in diameter at 3 feet from the ground. Moreover, it differs from them in no obvious respect, except that it inclines over to the southward at an angle of 15 or 20 degrees, whilst the others are quite upright.

Various friends have suggested to me that the phenomenon is connected with the boring of the larvæ of the Goat-Moth (*Cossus ligniperda*), which causes trees to exude sap (a phenomenon generally known as "bleeding"). On this exuded sap, many kinds of insect feed very greedily, especially, no doubt, when it is in a more-or-less fermented condition, owing to its exposure to the air. I am satisfied, however, that this is not the case in connection with this particular elm tree; for I can detect about it no trace of the well-known and unmistakeable smell of the goat-moth larva; nor can I find, in this or in any other of the trees, any trace of its borings.

Further, I cannot see about the tree any evidence of bleeding due to this or any other cause. I think it very probable, however, that the inclination at which the tree grows gives a strain to the wood of the trunk, or the bark, or to both, which causes splitting, thus giving rise to what one may term "internal

bleeding." This, though not obvious externally, may be sufficient to enable the insects to obtain a certain amount of sap (fermented or not) from the bottoms of the very deepest cracks in the bark. At all events, I can see nothing else to account for the regular autumnal congress of insects round this particular tree-trunk.

I find the fact that this phenomenon is observable occasionally in connection with particular trees in this district, especially elms, is quite well known among woodmen, hedgers, and farm labourers. Several of these have told me that, in the course of time, a tree thus affected always dies from it. One particularly-observant and intelligent old man, who has worked for me for six or seven years, and is now over eighty, tells me that, some years ago, he knew of an elm at Pryors, about half a mile away, which died from this cause.

DISCUSSION.

In the course of the debate which followed the reading of this note, Mr. Charles Nicholson, F.E.S., said :—

Mr. Christy having sent me in advance a copy of his note, I have been enabled to look up references to similar occurrences.

Unfortunately, I have never had the good fortune to come across a "bleeding" tree, so that I can offer no first-hand evidence on the subject. The phenomenon is, however, well known to entomologists, and many instances are recorded in the magazines; but they are difficult to find just when wanted, and those quoted hereafter are the only ones I have been able to trace so far.

The cause of the "bleeding" is undoubtedly, as a rule, injury inflicted on the tree; and this is *usually* due to borings of the larvæ of the Goat-moth (*Cossus ligniperda*), as will be seen by the instances quoted hereafter. The removal of branches and twigs, by pruning or otherwise, during the growing season is also liable to cause bleeding; and it seems to me highly probable that, in some cases (especially in such old trees as those of which Mr. Christy writes), high wind might cause the trunk or branches to split internally and so let out sap. Elm trees are particularly liable to shed their branches without any apparent cause and might be damaged easily in that way. I understand that Mr. Christy's tree does not appear to have been attacked by *Cossus*; nor has it lost any branches. It seems possible, therefore, that an internal split in the trunk may be the cause of the bleeding; and as the tree is old, this may be difficult to heal, as the tree leans and is, therefore, possibly in an unhealthy state.

Of the attractiveness to insects of exuding sap there is no doubt whatever. Coleoptera, Diptera, Hymenoptera, and Lepidoptera supply the bulk of the visitors. The sap of most trees contains more or less sugar, and easily ferments, thus forming alcohol, with the usual deplorable results to the imbibing insects! Hence the "drowsy and semi-stupified"

appearance of those noted by Mr. Christy and other observers, and probably also some of the wasps seen at the foot of the tree. Most likely these were not *all* victims of the hornets, although the latter are just as inimical to wasps as both are to flies and other insects.

"Bleeding," as observed in the field, is by no means confined to elms, as the records below will show, but I will take those relating to that tree first.

The Rev. C. R. N. Burrows, of Mucking Vicarage, in our county, writes to me as follows: "A large elm by my entrance-gate was very much visited, some three or four years ago, by wasps and an occasional *P. atalanta* [Red Admiral]. The former were quite a nuisance because they flopped about in a semi-intoxicated state. In these parts, the natives, when they observe wasps, etc., visiting a bleeding tree, observe that the tree is doomed to death. The tree above referred to is (as far as I can see) quite healthy still. A small tree, also an elm, as far as I can recollect, standing by a gate at the entrance of a pasture, was very much affected some years ago. That tree is gone."

Dr. N. H. Joy, referring to his observations on coleoptera frequenting *Cossus*-infected trees for exuding sap and other reasons, remarks¹ that, in nearly every case, in his neighbourhood (Bradfield, Essex), these *Cossus* trees are found in groups of three or four close together, and often one tree of the group is more severely attacked than the others; also that one occasionally finds an old tree very much eaten, with no others in its vicinity. He also mentions *Eugonia polychloros* (Large Tortoiseshell) and *Vespa rufa* (Red Wasp) as the most conspicuous visitors to the trees, apart from coleoptera, and that the sap does not begin to run from the trees until June and dries up again by the end of October. The trees he observed were mostly oaks (about 25), one elm, and two ashes, one of the latter having been killed.

There is also a reference² to the Camberwell Beauty (*Euwanessa antiopa*) having been caught at a "bleeding" elm near Cheltenham.

Other references to wounded oak trees (attracting *Eugonia polychloros* and *Pyrameis atalanta*) near Herne, Kent, are in *Entomologist*, xxxiii., p. 304. In a long account of hornets at Assington, the vicar alludes (*Entomologist*, xxx., p. 268) to sap exuding from an oak in his shrubbery as attracting one hornet at a time! There is also a reference (*Entomol.*, x., p. 252) to *E. antiopa* having been similarly attracted at Ryde, I.W.

Beside Dr. Joy's ash-trees there is a reference to one at Horsey, Norfolk, attracting *E. antiopa* and *P. atalanta*.

Then we have a note by Prof. Meldola⁴, recording *Vanessa io* and *E. polychloros* at sap exuding from birch trees, "from wounds in the bark or other causes," in the plantations near Wanstead Orphan Asylum; and *P. atalanta* and wasps are also noted⁵ in large number at a *Cossus*-attacked birch trunk on Wimbledon Common.

Besides several other records of butterflies attracted similarly to trees not specified, there is a case of a *Cossus*-infected alder near Norwich

¹ *Entomologist's Record*, xvi., p. 89.

² *Entomologist*, ix., p. 201.

³ *Ent. Rec.*, xi., p. 278.

⁴ *Essex Nat.*, v., p. 155.

⁵ *Ent.*, xxxiii., p. 268.

attracting *E. antiopa*⁶; a reference to the attractiveness (superior to that of fallows) of the sap of cut dogwood stems to spring moths⁷; and finally Mr. Burrows (*loc. cit.*) says that, during the past summer, a lime tree, which he had trimmed, "began to bleed slightly at a crack in the bark (I suppose where a shoot had been removed), and this crack was constantly visited and usually had some wasps wedged in it day and night. They seemed to be semi-drunk always."

There is also an old record⁸ of wasps and *P. atalanta* being seen sucking the sap exuding from a Cossus-infected Black Poplar.

It will thus be seen that, besides elm, oak, ash, birch, alder, dogwood, poplar, and lime sap is attractive to insects.

It will be noted that Mr. Christy and Mr. Burrows both refer to the belief that, when a tree is afflicted with "bleeding," it eventually dies of it; and, if the bleeding be due to *Cossus* attack or other serious injury, there is likelihood that such belief will be justified sooner or later, although large trees infested with *Cossus* have been known to exist for many years.

MUSEUM NOTE, No. VII.

PIED BLACKBIRD FROM WARLEY PLACE.

PRESENTED BY MISS E. WILLMOTT, F.L.S.

AN unusually-beautiful specimen of a pied cock blackbird, mounted in a glass case, has been presented to the Essex Museum by Miss Willmott.

She writes:—For some thirty years or more, the gardens of Warley Place have been frequented by pied blackbirds. The first that I remember was a pure white bird, which caused quite a sensation in the neighbourhood; but its beauty proved too great a temptation to those who knew the market value of such a bird. It was shot and sold to a London dealer. A year later, several pied birds appeared. One was white breasted; another white winged; another white tailed; there were several with a stray white feather here and there. The following year, a white breasted white winged blackbird enlivened the garden; and since that time we have never been without one or more pied birds. In 1911, another pure white blackbird appeared, and remained with us for about two years. In 1914, we frequently saw one marked like a cuckoo. In 1916, there were several pied birds—one with a pure white wing; another with half its head white;

⁶ *Ent. Monthly Mag.*, viii., p. 110.

⁷ *Ent. Rec.*, ix., p. 64.

⁸ *Science Gossip*, xiv., p. 35.

another with three white feathers in the tail ; another with one white tail-feather. The one now in the Essex Museum was certainly the prettiest I have seen. We kept it for several months, with an ordinary hen blackbird, in a large wired-in space round a tree, so that the birds could fly, and build in the branches. They seemed thoroughly at home for months, and enjoyed their food, which was thrown in every day. We had great hopes of an interesting progeny, but the beautiful bird died after a few days of depression. I took it up to Rowland Ward the same day. He told me he had never seen a bird so infested with insects, and that this was very probably the cause of its death. I never saw another pied bird with such symmetrical markings. As a rule they were more curious than pretty.

After the death of this bird, no more pied blackbirds were seen in the gardens for eighteen months or two years. Then, about the end of October 1918, to my great satisfaction, *three* more pied blackbirds appeared—one with a white tail, another with white on its head, and the third with nondescript white feathers unevenly distributed over its body. This revives the hope that the race may be continued at least for the present.

The specimen presented by Miss Willmott is, generally speaking, white, with black wings and tail ; the breast and flanks are closely mottled with black, and a few black feathers appear on the crown and back. In each wing is a single white quill. The beauty of the bird is chiefly due to the symmetrical disposition of the markings, the right and left sides being almost exactly alike.

New Essex Lichen.—Among the lichens collected at West Mersea on the occasion of the Club's excursion on 20th September 1913 (see *Essex Nat.*, xvii., pp. 229-234) was a form of *Lecanora hageni*, Ach., found growing on oak-sea-piles. This has since been determined by Miss A. Lorrain Smith, F.L.S., as var. *marina*, Th. Fr., a variety of the species which, although occurring on the Continent, had not previously been recorded from Great Britain. A specimen has been deposited in the British Museum herbarium, and is described in Miss Lorrain Smith's recent *Monograph of the British Lichens*, part i., p. 278 (2nd edition, 1918). —PERCY THOMPSON, Loughton.

BRITISH ASSOCIATION : CONFERENCE OF DELEGATES OF CORRESPONDING SOCIETIES, HELD IN LONDON, 4th JULY 1918.

By W. WHITAKER, F.R.S., DELEGATE OF THE ESSEX FIELD CLUB.

[*Read 26th October 1918.*]

THE meeting took place at the rooms of the Geological Society, under the presidency of Dr. F. A. Bather, F.R.S., who gave an address on "The Contribution of Local Societies to Adult Education."

Dr. Bather used the term "local" in the widest sense, so as to include the work of almost all scientific societies. He gave the number of such societies as were eligible to take part in the British Association work as 392, according to available lists, which, however, are incomplete: so we may put the number as something over 500, or, by including many smaller societies, which are little known, 1,000.

He noticed the geographic distribution of the societies, partly by means of a map. This map showed the existence of large areas without any sign, and naturally the congregation of societies was in or near great towns.

The number of members of these societies was given as well over 29,000; but there are probably many duplications. Including all the supposed 1,000 societies, a rough estimate of 200,000 members was given, which is, however, only 0.4 per cent. of the total population.

The chief educational work of the societies is done through lectures, excursions, and museums. It seems, therefore, that our Club, with its two museums, must be doing its full share.

A distinction was drawn between lectures *to* and lectures *by* a society (for the public). The latter should be in the nature of propaganda.

Excursions are to some extent lectures in another form—demonstrations; but, in some cases, fresh work is done, and "there is no better training for a naturalist than observation in the field."

Some societies exist only in connection with museums: in others, these are a primary function. In his list are 52 societies "actively responsible for museums." Whilst lectures and excursions are temporary, museums are continuous. The president (a prominent museum official) held clearly that "there is nothing like leather." He told us that all we have to do is to see that our museums are conducted properly, adding that, if we wanted to define "properly," we should apply to the Museums Association. Let us hope that our own efforts in this line will pass muster.

In the discussion, your delegate said that the primary object of local societies was to deal with local science: the educational work of spreading that knowledge came afterward. Our societies could help the schools, by teaching the scholars something of their surroundings. He also suggested that societies could help in the formation of libraries.

The question of Kent's Cavern, Torquay, was again raised, and it was agreed to ask the Council of the British Association to appoint a Committee to deal with the subject. This has since been done, and the matter will come before the Council of the Association next month.

Mr. M. C. Duchesne read an elaborate paper on "Afforestation," a subject the importance of which had been emphasised by the war. He treated of the National timber demands, and of what had been done (or not done) for them, and alluded to the proposals of the Forestry Sub-Committee of the Reconstruction Committee, himself suggesting a larger scheme as advisable, with more help from the state.

He held that the obligation to ensure reserves of timber lies not only with landlords, but with the various consumers of timber. It is due to private owners, who have kept up their woods in spite of difficulties and without state assistance, that reserves of native timber have been available for war-purposes; and he asks for the removal of various handicaps to the production of timber, and for the co-operation of scientific and practical men.

The importance of the subject of a regular supply of tree-seeds was noticed and nursery-work was treated of, allusion being made to the possibilities of woman-labour.

This paper, by an expert, was very well received, and led to a good discussion, in which Sir Charles Bathurst, M.P., took part, saying that Mr. Duchesne deserved thanks for the way in which, for years, he had advocated the claims of forestry.

Your delegate made some more-or-less relevant remarks, in which he was supported by the President.

In his reply, the author said that he was in favour of an Arbor Day, as suggested by Mr. J. Hopkinson, and offered to communicate with the secretary in the matter of tree-seeds, so that the various societies might help in collecting them.

A resolution was passed to the effect that trees should be planted on Arbor Day by the delegates and other members.

A Typomap, by Mr. B. B. Woodward, was exhibited. Its object is to enable occurrences of species to be recorded with approximate geographic accuracy, without the expense of specially-engraved maps.

A summary of a paper by Mr. P. Westall, on "Grants to Regional Museums" was read by the Secretary; but there was no time to discuss it.

The need for such grants was impressed on the author during the formation of the Museum at Letchworth Garden City, which was founded by the local Natural History Society. Such museums serve not only their society, but also the public and schools; so that they deserve outside support.

Rare Essex Bryophytes—Mr. F. W. Thorrington has presented to the Club's Herbarium at the Stratford Museum, specimens of *Plagiochila asplenoides* (L.) Dum., from Woodham Walter Common, and *Fissidens incurvus*, Starke, from Hornchurch, both gathered as long ago as 1912. The former is believed to be a new record for the county, and the latter for the southern vice-county.—PERCY THOMPSON, May, 1919.

ON THE ARBOREAL HABITS OF FIELD MICE.

By MILLER CHRISTY, F.L.S.

[Read 25th January 1919.]

FEW naturalists appear to realise adequately the extreme ease and skill shown by these small rodents in climbing trees and bushes, or the frequency with which they climb, or the fact that in autumn they obtain a large proportion of their food by practising their arboreal habits. These remarks apply chiefly, I believe, to the Bank Vole (*Evotomys glareolus*) and to the Long-tailed Field Mouse (*Apodemus sylvaticus*). The latter, in climbing, is assisted undoubtedly by its long semi-prehensile tail; but the former, which has a very short tail only, seems to be able to climb little, if any, less easily. Both species occur here at Chignal St. James, and the latter is very abundant in a wood adjoining to my house. Of late I have been making observations on them and their scansorial habits, with results here set forth.

Everyone must have noticed, in the hedges, in autumn, the number of old nests of small birds filled with a quantity of remnants of wild berries. These nests and their contents have been studied by several good observers, particularly by Messrs. Oldham,¹ Coward,² and Adams,³ who have found (as I myself have done also) that the remnants left in the nests are usually those of the "hips" of the wild rose (*Rosa canina*), though the berries of the hawthorn, the blackthorn, the holly, and other trees have been identified also. There can be no reasonable doubt that the berries have been gathered, and carried into the nest, and there eaten, by mice; and it seems likely that this work is usually that of the Vole. This species is commoner, as a rule, in the bottoms of hedges, in ditches, and among grass than the Field Mouse, which is found more often in woods and thickets. Yet, hitherto, the Field Mouse has been generally credited with the work, and there can be no doubt that he takes a part, though probably a small one. This habit of his was observed as long ago as 1834, when Mary Howitt noticed it in a very neat little poem addressed to the "Wood Mouse," another and highly-appropriate name by which the Long-tailed

¹ *Zoologist*, 1899, p. 27.

² *Id.*, 1901, p. 221.

³ See Millais' *Mammals*, ii., p. 193 (1905).

Field Mouse is often spoken of.⁴ Yet, as lately as 1905, in spite of this and the records of Messrs. Coward and Oldham (noticed above), Mr. J. G. Millais was able to speak of the creature's climbing habit, as "little known."⁵

I have placed in the Museum of the Essex Field Club, at Stratford, specimens of these gnawed rose-hips, taken from an old nest. If one examines critically the remnants left in these nests, one perceives quickly that the mouse's sole objective is the kernel contained in each of the seeds with which the comparatively-large "hip" of the rose is filled. To get at this, the bright red outer pulp of the "hip" is torn off and discarded—either thrown to the ground or left in the nest uneaten. Then the mouse takes one of the small hard seeds (or "stones"), and gnaws away its base, making a hole just large enough to enable it to extract the kernel, which it proceeds to eat, afterwards treating others in the same way.

In the case of these old deserted birds'-nests, used by mice as feeding-platforms or "dining-rooms," the height above the ground is usually small—seldom more than from three to five feet. To reach them requires, therefore, no very great agility on the part of the mouse. Yet the Vole (or whatever other kind of mouse makes use of them) must possess great skill in climbing bushes; for the berries apparently gathered by them, and conveyed to and eaten in these nests, grow, as a rule, on the top-most twigs of the hedges, and, to reach them, the mice have to climb usually to a height of at least ten or fifteen feet from the ground.

Turning to the Long-tailed Field Mouse, I have recently noted instances showing that its climbing powers are really remarkable.

Thus, of late, I have not infrequently found individuals sleeping in the nesting-boxes I have put up in the wood for small birds to breed in. These boxes are placed eight or ten feet from the ground, being affixed to the perpendicular sides of the trunks of fairly-large oak and ash trees. To reach them, the mice have to climb up the bark, clinging to its rough surface, which they are able to do with ease. Several times, when inserting my hand into a nest in one of my boxes, I have seized

⁴ Hereabouts it is often called the "Land Mouse," to distinguish it from the Domestic (or "House") Mouse, which frequents buildings almost exclusively,

⁵ *Mammals of Gt Brit. and Irel.*, ii., pp. 192-193 (1905).

hold of a wriggling mouse, which has jumped to the ground and thus escaped. On one occasion, my gardener, lying on the bank of a ditch which divides the wood from an adjoining meadow, whilst waiting for a chance to get a shot at a rabbit, actually saw, in broad daylight, one of these mice climbing up and down the bark of an ash-tree beneath which he was lying.

Quite recently, I have observed another instance of this mouse's remarkable climbing powers. Growing on the bank of the ditch already mentioned is a large bush of Hawthorn (*Crataegus oxyacantha*), sixteen or eighteen feet high, one of several. Last autumn, it bore fruit ("haws") in greater number and of larger size than those on any of the other bushes. Passing it about 22nd or 23rd October last, I noticed that its fruit was then fully ripe and of unusual size and brilliance of colouring. I noticed, too, that the bank and the bottom of the ditch just below the tree were both strewn thickly with what appeared to be fragments of the haws growing on the bush above. Getting down into the ditch, I found that this is what they really were. I came to the conclusion that they could only have been gathered by mice, which must have climbed among the top-most twigs of the bush, sixteen or eighteen feet up, had then chewed them into fragments, and thrown them to the ground, where they lay quite thickly, giving it a red tint as one viewed it at a distance of a few yards.

Examining next the individual berries, I perceived clearly that they had been treated exactly as are the rose-hips left by voles in old birds'-nests in hedges, as noticed above. It was obvious, in this case also, that the mice were in search of neither the soft pulp of the berry, nor its bright red outer skin, both of which were torn off and thrown aside, though these are eaten so freely by thrushes, blackbirds, and the like.

Often, the whole of the pulpy outer covering of the fruit was not torn off, but only that portion covering the base of the berry to a sufficient extent to enable the mouse to get at the "stone." Obviously, what the mice had been after was the kernel inside the stone of the fruit; and, to get at this, they had nibbled away the base of the stone, until they had made a hole large enough to extract the kernel, exactly as in the case of the much-smaller seeds in the hips of the Wild Rose, as described above.

In many cases, I observed that, in the process, the stone was split into its two halves.

I have placed specimens of these berries also in the Club's Museum.

There can be no doubt, I think, that in the case of these haws the work was done not by Voles (as in the case of the rose-hips mentioned above), but by the much-larger Field Mice.

CLIMBING OF THE WATER SHREW.

By FRED. J. STUBBS.

The Water Shrew will sometimes wander far from water; and, where a stream has been bordered by steep rocks, I have found that this agile animal is a ready climber. On the Pennines, I have often seen Water Shrews climbing over rocks; and both Common and Lesser Shrews exist in steep rocky woods and fields where climbing must be almost a necessity of existence.

That the little animal should be capable of climbing trees is, however, new to me. On the 2nd June 1910, near Rainham, I saw a Water Shrew leave the bank of the stream and run up the trunk of a pollard willow, a yard or so in front of me. It clung to the bark like a squirrel, with body pressed flat and the four legs widely spread; and it moved head downwards as easily and as rapidly as in the opposite posture. The eager little being was evidently searching for insects. In a few seconds, after being about six feet from the earth, it descended and vanished in the dense herbage. This took place about mid-day.

[Mr. Stubbs' note is of much interest; for the climbing powers of the Water Shrew appear hitherto to have passed almost unobserved (or, at any rate, unrecorded). I have searched the literature relating to the animal with some care; and, so far as I can find, none of the leading British writers thereon (neither Bell, Millais, nor Barrett-Hamilton) refer to its climbing powers. The only definite reference thereto which I have been able to discover is that of Mr. T. G. Rope, of Blaxhall, Suffolk, who says (*Zoologist*, 1900, p. 477), of an individual which he kept for a few hours in a mouse-cage, that "Its climbing powers were considerable, for it not only ascended easily the upright wires of its cage, but even made its way along the top, clinging back downwards to the wires."—ED.]

A THREE-SPURRED FORM OF THE LARGER BUTTERFLY ORCHIS (*Habenaria chlorantha* Bab.
var. *tricalcarata* Helmsley)

By G. LISTER.

THE Club's herbarium at the Essex Museum contains several fine typical examples of the Larger Butterfly Orchis, collected in various places. Amongst them, on a sheet marked "ex-herb. Wm. Moore," is a remarkable variety, collected in May 1893, in Braintree Green Wood. Instead of the usual long lax spike of large white flowers, this specimen has a dense spike of about fifteen rather small greenish-white flowers, all of which differ in construction from that of the normal form.

The typical Larger Butterfly Orchis has a broad upper sepal, two long spreading lateral sepals, two narrow petals ascending on either side of the upper sepal, while the third petal forms a long greenish-white lip with a slender tubular spur, containing honey and twice as long as the lip. In Mr. Moore's specimen, the upper sepal and two lateral petals are alike and narrowly triangular; the lateral sepals resemble the lip in all respects, except that they are shorter; each is provided with a long honey-bearing spur; the single stamen appears to have had well-developed pollinea with sticky discs, diverging even more than usual from each other, as they lie above and outside the openings into the three spurs. The stigma does not seem to have been functional; no trace of ovules was found; moreover, the ovary has not the usual twist, so that the spurs of the flower are directed more or less upward, instead of downward.

This strange variety appears to be very uncommon. A similar specimen, found near Sherborne, Dorset, in June 1906, was described and figured by W. B. Hemsley in the *Journal of the Linnean Society, Bot.*, 38, p. 6, pl. 1, as a new variety, *Platanthera chlorantha* Custor var. *tricalcarata*. In the same volume, Mr. Hemsley described another three-spurred form of the Butterfly Orchis, found near Bath about the year 1902; but the flowers in this have the lateral petals, not the lateral sepals, provided with long spurs (*op. cit.*, p. 391, figs. 1, 2.).

THREE OLD ESSEX HERBARIA.

By W. G. CLARKE, F.G.S.

THERE are now in the possession of Mr. W. H. Freeman, of High Street, Brentwood, three herbaria, two made by his father and the other by his grandfather. Two of these are in bound quarto volumes, with the plants well-preserved and beautifully mounted, the paper used being first class. Each specimen is named; and, in the two volumes, I found one error only. Unfortunately, however, localities are not given, though there is every reason to believe that most of the plants were collected in Essex.

The older of these two herbaria is described as a "*Hortus Siccus*," and is dated 1808. It was the work of John Freeman, who was born in 1784, at Chipperfield, Herts, and died in 1864. He became assistant to Dr. Newman at his school at Bromley-by-Bow, and subsequently at Stratford, afterwards becoming proprietor of the latter, a well-known educational establishment opposite the present Passmore Edwards Library and Museum. John Freeman was a prominent Baptist and examiner in Hebrew, Chaldee, and Syriac, of the students of Stepney College. Both as an astronomer and botanist, he was well known to the scientific men of his day. He was a close friend of Mr. Brewer, author of the *Flora of Reigate*, and, as a cousin of the wife of Mr. F. E. Hulme, F.L.S., enjoyed his intimate friendship. The plants in this herbarium include *Campanula rapunculus*, *Lavatera arborea*, and *Euphorbia portlandica*, as well as many others, all probably collected in the neighbourhood of Stratford.

The other herbarium was made by Joseph Freeman, L.C.P., who was born at Bromley-by-Bow in 1813 and died in 1907. The specimens were collected between 1832 and 1837, and include *Lathyrus macrorrhizus*, *Sedum album*, *Mentha hirsuta*, *Trientalis europæa* (from Scotland), *Narthecium ossifragum*, *Hyoscyamus niger*, *Glaucium luteum*, *Geranium striatum*, *Datura stramonium*, *Campanula trachelium*, *C. hederacea* (found in a bog at High Beech), *Ophrys apifera*, *Paris quadrifolia*, *Hutchinsia alpina* (from the Alps; presented by Dr. McCreight), *Aceras anthropophora*, *Ophrys muscifera*, and *Orchis ustulata*. The presence of these orchids is probably accounted for by the

fact that Dr. Joseph Freeman's mother was a Miss Hersee from Sussex, and that he was a frequent visitor to that county. Holidays were also often spent at Southwold and Aldeburgh, and some of the specimens were probably collected in those localities. The majority seem, however, to have been gathered in Essex.

The third herbarium was also made by Joseph Freeman and consists of 116 specimens, mounted on separate sheets. In every instance, the locality, and the year in which the plant was found, is given. The collection was made between 1836 and 1840, but the majority of the plants were gathered in 1838. Most of them came from Stratford, "near Stratford," and Wanstead. Other localities given are Low Leyton, near Leyton, Leytonstone, Plaistow Marshes, East Ham, Woodford, near Woodford, High Beech and Snaresbrook. These specimens will always have an interest for Essex botanists, not because of their rarity, but because the growth of greater London has covered most of the places in which they were found with bricks and mortar. A few of the species probably survive in their ancient habitats, but for most of them search would be in vain.

It is unnecessary here to chronicle the various species and localities. Many are given in Joseph Freeman's *Stratford Flora* mentioned hereafter. A few specimens, however, may be mentioned:—*Isatis tinctoria* was found near Albury, Surrey, in 1838; *Dianthus caryophyllus* on an old wall at East Ham in 1840; *Geranium striatum* near High Beech in 1836; *Drosera rotundifolia* at High Beech in 1838; *Campanula patula* in a field near Leytonstone church in 1839; *Cuscuta epithymum* at Wanstead in 1838; *Hottonia palustris* at Stratford in 1838; and *Polygonum bistorta* at Stratford in 1839.

Joseph Freeman has a permanent place among Essex botanists as the author of a list of the more interesting plants found by him during his excursions in the vicinity of Stratford, Leytonstone, Wanstead, and Snaresbrook, numbering 191 species, published in 1839.¹ He wrote also a small volume entitled: *The Stratford Flora: containing a List of the Flowering Plants and Ferns growing spontaneously in the neighbourhood of Stratford, Essex, arranged according to the Natural System, by Joseph Freeman* Printed by G. Blight, Fenchurch Street, E.C. (1862,

¹ *Proc. Bot. Soc. of London*, i (1839), pp. 48-49.

8vo., 21 pp.)² In his preface, he says that, "with few exceptions, the plants have been found by the writer himself, and no other species has been admitted into the list but upon good authority." He adds that the list is "the result of more than twenty years' careful observation." The species recorded number 317.

Freeman also supplied to Gibson localities of plants he had found in the neighbourhood of Stratford.³

[Since the foregoing was written, Mr. W. H. Freeman has presented the three herbaria to the Museum of the Essex Field Club, at Stratford.—ED.]

J. P. Johnson: Obituary Notice.—We deeply regret to announce the death, at the early age of 38, of this former member of the Club, whom many will remember. Born in London in 1880, he was educated at Dulwich College and the Royal School of Mines. In 1902, considerations of health compelled him to migrate to South Africa, where he died at Johannesburg on 18th October last, from pneumonia following an attack of influenza. His contributions to geological science and prehistory are valuable and numerous. He contributed many papers to the pages of this journal and will always be remembered by his valuable discoveries in the Pleistocene Deposits of Ilford. It is, indeed, largely owing to his enthusiasm and keen hunting that our knowledge of this deposit is so well founded. Mention should also be made of his paper on the Eocene Flora and Fauna of Walton-on-Naze (*Essex Naturalist*, xi., pp. 284-7). Many of his Essex specimens were given by him some time ago to our Museum at Stratford. He was a member of the Council of the Geological Society of South Africa and was appointed by the South African Government a member of the Commission to report on the petroglyphs and rock-paintings of South Africa, many of which are reproduced in his *Prehistoric Period in South Africa* (2nd edition, 1912).

Occurrence of Trout in the River Roding.—On the 6th October, while angling for chub in the Roding, I was much surprised to catch a ten-inch trout. It was in fine condition, and the herring-like colour, absence of red, abundance of stellate black spots, slender jaws, and dark-tipped adipose fin all indicate that the fish was not the common English Brook

² There is a copy of this work in the Club's Library.

³ *Flora of Essex* (1862), p. xx.

Trout, but the Loch Leven Trout (*Salmo levenensis*). This is usually held to be a distinct species, but some authorities state that the form is no more than a mere geographical variety of *Salmo trutta*. Whatever view is taken, a Loch Leven trout could not be in the Roding by any natural means, and the specimen now noticed is obviously not native.

During the past few months, I have heard rumours of trout (or, at least, a spotted fish otherwise unknown to the local anglers) being taken from this river. It happens, however, that the roach here are frequently subject to a bacterial parasitic disease which causes small black spots on the back and flanks, and this was borne in mind when I heard the vague reports of trout in the Roding. It now appears that some, at least, of these strange captures were correctly identified as trout; and it is indeed possible that this very desirable fish may succeed in establishing itself as a breeding species. Perhaps this stage has already been reached.

I have not heard of any actual introduction of trout in the Roding, and the river may have been stocked by the overflow from some private fish-pond.—FREDK. J. STUBBS.

[It is said that about 2,000 small Brook Trout were introduced into the Roding, about 1881, by the Rev. R. M. Rodwell, of High Laver (*Essex Nat.*, i., p. 149: 1887); and Dr. Laver states (*Mammals, Reptiles, and Fishes of Essex*, p. 104) that, at the time he wrote (in 1898), they still appeared "to be doing well." Trout of good size have also occurred for many years in the Brook Cann, where it runs through the parishes of Chignal and Roxwell, having been introduced there quite fifty years ago; and they appear to be flourishing, though not increasing in numbers. These are, however, I assume, all the common Brook Trout. Of the introduction into Essex of the Loch Leven Trout there is (so far as I know) no definite record.—ED.]

Food of the Little Owl.—The Little Owl (*Athene noctua*) is popularly believed to be a harmful bird, and in consequence it has become the mark of farmers, gamekeepers, and promiscuous gunners.

The results of my investigation of the gizzard-contents of three Little Owls during March last seem to show, however, that during part of the year at least, this species is certainly harmless, and probably distinctly useful to the very people who shoot them recklessly. The records are as follows:—

1. The gizzard contained nine dor-beetles, almost entire and undigested.
2. The gizzard contained the elytra of five minute beetles, some mouse-hair, and one down feather (possibly its own).
3. The gizzard contained one beetle, some moss and one down feather.—A. HIBBERT-WARE, F.L.S., *Wanstead*.

SUPPLEMENTAL REPORT ON THE LICHENS OF EPPING FOREST.

By ROBERT PAULSON, F.L.S. F.R.M.S., AND PERCY G. THOMPSON, F.L.S.

[Read 25th January 1919.]

WHEN, on 24th February 1912, we read before the Club our Second Paper on the Lichens of Epping Forest, we expressed the opinion that we were then, with a record of 109 forms, nearing, in all probability, the limit of the present-day lichen-flora of the Forest district. This forecast has proved to be not inaccurate.

Since 1912, we have met with some twenty additional forms only to those previously recorded by us; and it seems desirable to complete our Report by adding these to our published lists.¹ The new records are as follows:—

Chænotheca melanophæa, Zwackh.,

var. *flavocitrina*, Pauls.

On oak-trunk, to N. of Great Monk Wood: fertile.

Coniocybe furfuracea, Ach.

On hedge-bank at Oak Hill, Theydon Bois: fertile.

Cyphelium stigonellum, A. Zahlb.

On thallus of *Pertusaria* on oak-trunks near Shingle Hall, Epping Upland, near "Wake Arms," and near Wake Valley Ponds: fertile.

Collema glaucescens, Hoffm.

On wet clayey ground, Pinner's Green, Highbeach: fertile.

Peltigera rufescens, Hoffm.

var. *praetextata*; Nyl.

On ground near Dulsmead Hollow, in old gravel-pit at Oak Hill, Theydon: sterile.

Placodium callopismum, Mér.,

On ragstone plinth, Great Parndon Church: fertile.

Placodium citrinum, Hepp.

On cement walls, Loughton Sewage Farm: fertile.

Physcia pulverulenta, Nyl.

form *subvenusta*, Oliv.

On elm-trunk near Hayles Farm, Epping Upland: sterile.

¹ See *Essex Naturalist*, xvi. (1911), pp. 136-145; *op. cit.*, xvii. (1913), pp. 90-105.

Lecanora atra, Ach.

On brick wall, Uplands, Loughton : sparingly fertile.

Lecanora Hageni, Ach.

On willow trunk, Roding bank between Loughton and Buckhurst Hill : fertile.

Lecanora polytropa, Schær.

On flints, Great and Little Monk Woods : fertile.

Lecanora calcarea, Sommerf.

On stonework of Epping Old Church ; ditto, Nazing Church : sparingly fertile.

Thelotrema lepadinum, Ach.,

On fallen hornbeam trunk, Green Ride to S. of Great Monk Wood : fertile.

Cladonia uncialis, Web.

form *bolacina*, Nyl.

On heathy ground by Green Ride to E. of Great Monk Wood : sterile.

Cladonia digitata, Hoffm.

On banks, Jack's Hill ; ditto, by Green Ride to E. of Great Monk Wood : fertile.

Lecidea Friesii, Ach.

On oak trunk, N. of Great Monk Wood : sterile.

Lecidea ochracea, Wedd.

On cement, Jack's Hill, Theydon : fertile.

Lecidea contigua, Fr.

On brick wall-tops, Theydon Bois railway station, Epping town ; etc. : fertile.

Verrucaria rupestris, Schrad.

On limestone coping of wall, Loughton Church ; on tombstone, Epping Old Church ; etc. : fertile.

Since the appearance of our earlier papers, the synonymy of the Class Lichenes has undergone extensive modification owing to the publication of Miss A. Lorrain Smith's exhaustive *Monograph*² by the British Museum authorities. It appears advisable, therefore, to bring our previous lists, so far as thereby affected, into line with the new nomenclature. This is as follows :—

Calicium melanophæum, Ach. is now **Chænotheca melanophæa**, Zwackh.

Do., var. *ferrugineum*, Schaer. is now Do., var. *ferruginea*, A. L. Sm.

² A *Monograph of the British Lichens*, part i., 2nd edition, 191 .

Calicium quercinum var. *lenticulare* f. *chlorodes*, Nyl. is now
Calicium quercinum, Pers., sub. sp. *curtiusculum*,
 Cromb.

Calicium trachelinum, Ach. is now **Calicium sphærocephalum**, Wahlenns.

Trachylia tympanella, Fr. is now **Cyphelium inquinans**.
 Trev.

Pycnothelia papillaria, Duf. is now **Cladonia papillaria**,
 Hoffm.

Cladonia fimbriata, var. *tubæformis*, Fr. is now **Cladonia fimbriata**, var. *simplex* Wainio.

Do. var. *carneopallida*, Nyl. is now **Cladonia ochrochlora**,
 Floerk.

Do. sub. sp. *fibula*, var. *subcornuta*, form *nemoxyna*,
 Nyl. is now **Cladonia fimbriata**, sub. sp. *fibula*, form
nemoxyna, A. L. Sm.

Cladonia furcata, sub. sp. *racemosa* Nyl. is now **Cladonia furcata**, Schrad., var. *pinnata*, Wain.

Cladonia macilenta, var. *coronata*, Nyl. is now **Cladonia flabelliformis**, Wain.

Cladonia Flørkeana, form *trachypoda*, Nyl. is now **Cladonia Flørkeana**, Fr., var. *carcata*, Wain.

Cladina sylvatica form *tenuis* Flk. is now **Cladonia sylvatica**, Hoffm.

Usnea hirta, Hoffm. is now **Usnea florida**, Web., var. *hirta*
 Ach.

Platysma glaucum, Nyl. is now **Cetraria glauca**, Ach.

Parmelia Borreri, Turn. is now **Parmelia dubia**, Schaer.

Physcia parietina, Ach. is now **Xanthoria parietina**, Th. Fr.

Physcia lychnea, Nyl. is now **Xanthoria lychnea**, Th. Fr.

Physcia pulverulenta, sub sp. *pityrea*, Nyl. is now **Physcia grisea**, A. Zahlbr.

Physcia stellaris, subsp. *tenella* Nyl. is now **Physcia hispida**,
 Tuckerm.

Physcia ulothrix, var. *virella*, Cromb. is now **Physcia orbicularis**, Dalla Torre and Sarnth, var. *virella*,
 Dalla Torre and Sarnth.

Lecanora saxicola, Ach. is now **Lecanora muralis**, Schaer.

Do. do. subsp. *albomarginata*, Nyl. is now
Lecanora muralis, Schaer.

Lecanora murorum, Ach. *is now* **Placodium murorum**, D.C.

Lecanora vitellina, Ach. *is now* **Candelariella vitellina**, Müll-Arg.

Lecanora laciniosa, Nyl. *is now* **Candelaria concolor**, Wain.

Lecanora aurantiaca, Nyl. *is now* **Placodium aurantiacum**, Hepp.

Do. do. subsp. *erythrella*, Nyl. *is now* **Placodium aurantiacum**, var. *flavovirescens*, Hepp.

Lecanora cerina, Ach. *is now* **Placodium cerinum**, Hepp.

Lecanora exigua, Nyl. *is now* **Rinodina exigua**, S. F. Gray.

Lecanora subfusca, var. *campestris*, Nyl. *is now* **Lecanora campestris**, B. de Lesd.

Lecanora allophana, Nyl. *is now* **Lecanora subfusca**, Ach. var. *allophana*, Ach.

Lecanora rugosa, subsp. *chlarona*, Nyl. *is now* **Lecanora subfusca**, Ach., var. *chlarona*, Ach.

Lecanora albella, Ach. *is now* **Lecanora pallida**, Schaer.

Lecanora conizæoides, Nyl. *is now* **Lecanora conizæa**, Nyl., var. *conizæoides*, A. L. Sm.

Pertusaria amara, Nyl. *is now* **Pertusaria faginea**, Leight.

Pertusaria communis, D.C. *is now* **Pertusaria pertusa**, Dalla Torre and Sarnth.

Urceolaria scruposa, Ach. *is now* **Diploschistes scruposus**, Norm.

Taking into account these modifications, our total record of lichens amounts to 127 forms.

We take this opportunity of correcting one or two *errata* in our earlier Lists, as follow :—

Peltigera canina, Hoffm. *should be* **P. polydactyla**, Hoffm.

Rhizocarpon petræum, Massal, *should be* **R. confervoides**, D.C.

Physcia lychnea, Nyl. : for “fertile” read “sterile.”

ESSEX FIELD CLUB : REPORTS OF MEETINGS.

BOTANICAL RAMBLE IN THE EPPING AND COOPERSALE DISTRICT. (487th MEETING).

SATURDAY, 11TH MAY 1918.

A bright sunny day, following a period of cold dull weather, tempted some 30 members and friends out into the pleasant Essex country, now clad in its fresh greenery of Spring. Ostensibly a botanical ramble, undertaken (in the words of the circular calling the meeting) "for the purpose of studying the Spring Flora of this beautiful District 'whan comen is the May,'" the expedition resolved itself into a general nature-study ramble in the true Gilbert White spirit, the birds, now in their full song, the flowers, the mosses, the mycetoza, and the insects, all claiming their votaries.

The party assembled at Epping station at 11.8 o'clock and at once, under the guidance of the Acting Hon. Secretary, struck eastwards through the fields, and along a delightful, though muddy, bridle-path, until the "Theydon Oak" at Coopersale Street was reached, crossing a tract of country confessedly new to most of the company. The Lesser Periwinkle (*Vinca minor*) in flower, was growing at Steward's Green; and many flowers of Hawthorn, almost all proving to be the variety *eu-oxyacantha*, with two styles, were examined critically for varietal determination.

Ascending the winding road by Coopersale House and Church, past roadside cottages with trim gardens, Coopersale Common was reached soon after 1 o'clock, and lunch was voted imperative: this *al fresco* meal being partaken of to the charming accompaniment of the songs of two nightingales in the near bushes—"smale fowles maden melodye." In the afternoon, the ramble was continued into Birching Coppice, where large patches of Lily of the Valley (*Convallaria majalis*), just coming into flower-bud, delighted the eyes of the botanists, and the ornithologists were gratified by the abundant singing of the Wood Wren and other songsters.

Two species of mycetoza, *Reticularia lycoperdon* and *Lycogala epidendrum*, the latter in both the coral-pink plasmodium stage and with mature æthalia, were met with, while the antheridia of *Polytrichum formosum* claimed the attention of other members of the party. A nest of the black ant was "bagged" as a great prize, and the protective resemblance of the common grasshopper, *Tettix bipunctatus*, to the dry leaf fragments and bare turfy soil which it frequents, was commented upon, and specimens secured for the Club's museum. Burrows of the Tiger Beetle larva were noticed in the sandy soil, and the pools on Coopersale Common yielded the Bladderwort (*Utricularia vulgaris*), the moss *Hypnum aduncum*, and other treasures, including various aquatic insects, such as the voracious larva of *Dytiscus*, the Water-scorpion (*Nepa*), Whirligig beetles (*Gyrinus*), and others.

On the way back to Epping town, the not-common caryophyll, *Mænchia erecta*, was seen growing in the grass of Epping Plain.

Tea was taken at the Thatched House Hotel at Epping. After tea,

a short formal meeting of the Club was held, with Miss E. Willmott, F.L.S., V.M.H., member of Council, in the chair (our President having had to leave the party somewhat earlier), when Mr. John H. B. Jenkins, of Glenmore, Tavistock Road, Snaresbrook, was elected a Member, and three nominations for membership were announced by the Acting Hon. Secretary.

While waiting for the return train, many of the visitors entered Epping Church, and inspected the elaborate gilt organ-front and the beautiful modern rood-screen and other fittings of this excellent example of modern Gothic architecture.

FIELD MEETING AT NORTHWOOD AND RUISLIP. (488th MEETING.)

SATURDAY, 8TH JUNE 1918.

A Field Meeting was arranged in this charming district of Middlesex on this date to enable Members to study the local botany and geology under the leadership of Mr. Robert Paulson, F.L.S., and Mr. William Whitaker, B.A., F.R.S., F.G.S. respectively.

The party, to the number of nearly 30, met at the Pinner and Hatch End station of the Bakerloo extension to Watford at 11.15 o'clock, and made its way across fields radiant with buttercups to Pinner Hill, crossing *en route* the old British shallow earthwork known as Grimm's Dyke, which marks, in all probability, a pre-Roman tribal boundary, "herborizing" and entomologizing being indulged in by the way.

On Pinner Hill, utilising an extensive view southwards over the lower country, Mr. Whitaker gave a short account of the geological features of the neighbourhood, pointing out that, on its passage from the station, the party had crossed an inlier of Reading Beds in a mass of London Clay. Pinner Hill is itself of London Clay, capped by high-level "Plateau Gravel," derived probably from once-overlying pebbly Bagshot Beds, which have long since been entirely denuded away, though beds of similar age still cap Harrow Hill to the south.

Mr. Paulson then took up the theme by calling attention to the effect on the tree-flora of the different geological formations. He pointed out that, in woods on the lower London Clay grounds, *Quercus pedunculata* is the dominant form of Oak, with Hazel association, whereas, on the hill slopes and higher grounds, *Quercus sessiliflora* becomes the characteristic form, and is associated with Hornbeam, Beech, and Birch.

Skirting the growing town of Northwood, the geologists of the party examined a small section in the Reading Beds on the golf-links, just to the south of the town, which showed a fine pale-yellow quartz sand without pebbles. Meanwhile, a number of interesting plants was noted by the botanists on the adjoining ground, including again *Maenchia erecta*, which had been noted at Epping on the last excursion.

The most important botanical observation of the day was made at Ruislip Reservoir. The level of the water was low, the reservoir having been partly drained recently, and the margin exhibited a distinct, broad, orange-coloured zone, following the contour of the water along the entire length of the reservoir, for nearly $\frac{1}{2}$ mile, and strikingly evident from a

distance: this orange zone, on closer acquaintance, was found to be a mass of *Alopecurus fulvus*, the well-named Orange-spiked Foxtail grass, in enormous profusion and in full flower. In addition to this pure association, the same rare grass was growing elsewhere intermixed with *Polygonum amphibium* in a slightly higher zone, while *Equisetum limosum* formed dense masses in other portions of the old reservoir-bottom. This remarkable abundance of *Alopecurus fulvus* is noteworthy and of considerable ecological interest. It is a local grass, nowhere abundant as a rule, and its present occurrence in such profusion, as a colonizer of the new ground laid bare by the abnormally low level of the water in the Reservoir, is a subject for speculation.

Mr. L. B. Hall, F.L.S., was busily hunting for plant-galls, and records the following captures:—

On *Hypericum humifusum*, galls of the dipterous fly, *Perrisia serotina*, Winn.

On *Galium saxatile*, galls of the mite *Phyllocoptes anthobius*, Nal. —This gall was first recorded for Britain only last year, the present record being the first for the South of England. This gall has also been recorded on *Galium mollugo*.

On *Prunus spinosa*, galls of the acarus *Eriophyes similis*, Nal.

On *Tilia vulgaris*, galls of *Eriophyes tiliæ*, var. *liosoma*.

On *Veronica chamædrys*, galls of the fly *Perrisia veronicæ*, Vall.

On *Populus tremula*, a gall of the longicorn beetle, *Saperda populnea*, Linn.

On Hawthorn, galls of the mite *Eriophyes goniothorax*, Nal.

On Field-Maple, the leaf-galls of *Eriophyes macrorrhynchus*, Nal., and

On Yew, the galls of *Oligotrophus taxi*, Inchb.

On arrival at Ruislip, the visitors were welcomed at the Church by the Vicar, and by Mr. F. Herbert Mansford, a local architect, each of whom gave some account of the architectural features of the edifice and of its monuments.

Tea was taken at "The Poplars" tea-gardens; after which a short formal Meeting of the Club was held, with the President in the chair, when three persons were nominated for membership, and the following three persons were elected Members, viz.:—

Miss Margaret Horn, }
Miss Edith M. Horne, } of "Ivylands," Epping.

Mr. Arthur A. Pearson, F.L.S., of "Goodacre," St. George's Avenue, Weybridge, Surrey.

Votes of thanks were accorded also to those who had contributed to the amenities of a very enjoyable expedition.

The return-journey to London, from Ruislip station at 6.38 o'clock, was made "sandwich-fashion" in a much overcrowded train, where even "strap-hanging" was an unattainable luxury.

VISIT TO WEST HAM CHURCH AND PARK AND TO THE CLUB'S STRATFORD MUSEUM. (489th MEETING.)

SATURDAY, 29TH JUNE 1918.

This afternoon visit to places of interest in the immediate neighbourhood of the Club's headquarters was arranged in conjunction with

the recently-inaugurated Gilbert White Fellowship, when also the members of the Fellowship were invited to inspect the Club's Museum in the Romford Road.

Some 50 or more Members of the combined societies met the guide (Mr. Percy Thompson) at Stratford railway station at 2 o'clock, and proceeded to the old Parish Church of West Ham, where the party was received and welcomed by the Vicar, the Rev. G. Rogers). Our member Mr. John Avery gave an extempore account of the life of "The Stratford Naturalist," George Edwards, F.R.S., who was buried in the churchyard, in a now-lost grave, in 1783.

Mr. G. J. B. Fox, a member of the St. Paul's Ecclesiological Society, then gave an address on the history and structure of the ancient edifice, in which the visitors were assembled, and the building was carefully inspected, both within and without. The parish registers, with their records of the birth and death of George Edwards, were also examined curiously.

The party next walked to West Ham Park, and was received at the Entrance Gates in the Portway by the Park Superintendent, Mr. D. M. Russell, who acted as a most efficient guide in showing all the various objects of interest, whether rare trees or historic buildings, which came within his domain.

The house in which Elizabeth Fry lived from 1829 to 1844, "Upton Lane House," formerly known as "The Cedars," and now used as the headquarters of the 6th Battalion of the Essex Regiment, was visited, and a sketch of the life-work of the gentle Quaker-philanthropist was given by our President, Miss G. Lister, who also, when the cairn which marks the site of Ham House was reached, gave an interesting account of the lives and works of Dr. John Fothergill, the Gurneys, the Frys, and the Listers, who have made the name of Upton familiar as having been their dwelling-place.

Some of the many arboreal beauties of the Park were pointed out by Mr. Russell, including the celebrated Turkish Hazel (*Corylus colurna*, Linn.), 60 feet or more in height, one of the very few specimens of this tree to be found in this country, into which it was introduced in the middle of the 17th century. Unhappily, all the Cedars of Lebanon, planted by Dr. Fothergill, have died in recent years, possibly on account of the drainage of the sub-soil having been interfered with.

Tea was taken, by kind permission of the authorities, in the Committee Room in the centre of the Park, and this meal evoked general surprise and appreciation by reason of the unwonted excellence of the provender in these rationed times. After tea, votes of thanks were accorded to all who had contributed to the enjoyment of the afternoon.

The party then made its way to the Club's Museum, where, in the Library, the Curator, in the name of the President and Council of the Club, welcomed the Members of the Gilbert White Fellowship to their headquarters, and gave the visitors a brief account of the history of the building and of the origin of the Club's Museum. An inspection of the collections followed, and called forth expressions of appreciation from the visitors.

VISIT TO WATERMEADS, MITCHAM, SURREY,
(490th MEETING),

SATURDAY, 6TH JULY 1918.

Just over twenty Members and friends journeyed to Mitcham on the above afternoon to inspect under the conduct of Dr. H. G. T. Major and Mr. W. Whitaker, B.A., F.R.S., the nature-reserve known as "Watermeads."

"Watermeads" consists of two enclosures of the river Wandle and its banks, the property of the National Trust for Places of Historic Interest or Natural Beauty. The larger enclosure was purchased for £1,050 by the River Wandle Open Spaces Committee and handed over by them to the Trust in 1914; the smaller (known also as the "Happy Valley" or "Ravensbury Park") having been presented to the Trust in 1913 by Mr. Richardson Evans in memory of the late Miss Octavia Hill. The larger portion comprises some twelve acres, and includes two arms of the river, with bordering meadows, and a jack-pond. Some fine tall-grown trees are upon the land in the smaller enclosure, and constitute a charming and characteristic feature.

The Wandle rises by numerous springs at Carshalton and Beddington, and is essentially a chalk-stream, its clear limpid water and strong current being remarked upon by the visitors, accustomed as they were to the more sluggish and turbid rivers of our Essex clay-lands.

Some three hours were spent in a leisurely ramble through the Trust domain, noting the wild and semi-wild flora, and collecting (in moderation!) the beetles and other insects which occurred abundantly on the plants of the river-banks, and the galls on the leaves and petioles of the bordering trees. A growth of the water-moss *Fontinalis antipyretica* upon the sides of the old weir was found to be infested with colonies of the beautiful Florideous alga, *Batrachospermum moniliforme*, in fine condition, together with the filamentous alga *Cladophora*.

Tea was taken in the nursery gardens close by.

A short formal Meeting of the Club was held after tea, when the following were elected Members:—

Miss Agnes M. Wire, 5, *St. John's Terrace, Buckhurst Hill*.

Mr. Ernest C. D. Wire, 5, *St. John's Terrace, Buckhurst Hill*.

Miss Younghusband, 3, *Buckingham Gate, S.W.1*.

Miss Gertrude B. Jenkinson, 26, *Palmerston Road, Forest Gate, E.7*.

Votes of thanks were cordially passed to our Conductors.

The majority of the party hurried off to the station to catch the 6.18 o'clock train to town, but a little band of enthusiasts elected to walk to Mitcham Common, where many heath-plants were noted, including as a rarity the grass *Koeleria cristata*.

At 7.40 a fast train was caught at Mitcham Junction station, and London Bridge was reached at 8.10 p.m.

VISIT TO WARLEY PLACE, GREAT WARLEY.
(491st MEETING).

SATURDAY, 5TH OCTOBER 1918.

A fifth visit to Warley Place was paid by the Club on the above after-

noon, by kind invitation of our Member, Miss E. Willmott, F.L.S., V.M.H. The later date of the present visit gave a welcome opportunity of seeing the Gardens in an aspect different from that enjoyed on former occasions.* The weather, though dull and rather cold, remained dry, and allowed the visitors to inspect their beautiful surroundings in comfort. Some 26 persons were present.

Brentwood was reached at 2.8 p.m. by fast train from London, and the party walked to Warley, and was received by our hostess shortly before 3 o'clock. A tour of the grounds was at once entered upon, commencing with the sunken alpine-garden, beautiful as ever in its artistically natural simplicity. Unfortunately, the shortening daylight permitted only a small portion of Miss Willmott's charming domain being inspected.

Afternoon tea was kindly provided by our hostess (notwithstanding Rationing Orders!), and an added delight was afforded to booklovers of the party by her exhibition of various early 17th century illustrated books on gardening, in elaborate original bindings. The President, in thanking Miss Willmott for her kindly welcome on yet another occasion, mentioned that the Club owed a further debt of gratitude to our hostess, who had promised to present a copy of her magnificent monograph "*The Genus Rosa*," to the Club's library. This announcement was greeted with acclamation by the Members present, and a hearty vote of thanks was passed to Miss Willmott for her repeated kindnesses. Miss Willmott responded, and expressed the hope that the present would not be the last occasion on which the Club would visit her.

A sharp walk to Brentwood in the deep dusk enabled the visitors to catch the 6.42 train to town, after a most enjoyable afternoon.

ANNUAL FUNGUS FORAY (492nd MEETING).

SATURDAY, 19TH OCTOBER 1918.

The customary autumnal Fungus Foray of the Club was held in Epping Forest on this date, when some 64 Members and friends attended. As on former occasions, some Members of the Selborne Society, of the Gilbert White Fellowship, and of the School Nature Study Union were present as visitors, by invitation of the Club. The weather was bright and sunny, following a night of heavy rain.

The Referees for the day were the President, Miss A. Lorrain Smith, F.L.S., Miss E. M. Wakefield, F.L.S., Mr. F. G. Gould and Mr. Arthur A. Pearson, F.L.S.

The route chosen was designed to cover somewhat new ground from that traversed in former Forays. Assembling at Buckhurst Hill station at 11.4 o'clock, the party entered Lord's Bushes and commenced to collect, but with somewhat indifferent results as regards number of specimens, although reports of a week earlier had been very favourable. One or two heavy night frosts during the week may have had a prejudicial effect upon the fungi. Crossing the Epping New Road, and the low-lying grass-land of the Ching valley, the main woodlands were entered about

* Former visits were on 5th August 1911, 18th May 1912, 26th April 1913, and 6th April 1914. For a detailed description, with photographs, of the Gardens see *Essex Naturalist* xvii., 1912, p. 40.

Connaught Waters, and from here to Highbeach, by way of Bedfords Oak, Cuckoo Pits, Fairmead, and the High Wood, fair gatherings of specimens were made, so that the subsequent display of finds at the Headquarters at the Roserville Retreat was by no means bad, and, as has been remarked in previous years, a season of scarcity of individuals has often yielded relatively greater results as regards rare specimens. So it proved on the present occasion. Miss Wakefield and Mr. Pearson reported the following new records of hymenomycetes for the Forest:—

Hygrophorus limacinus (Scop.), Fr.

Hygrophorus obrusseus, Fr.

Nolanea papillata, Bres.

Hebeloma longicaudum, (Pers.), Fr.

Flammula sapinea, Fr.

Corticium subcoronatum, v. H. and L.

Corticium arachnoideum, Berk.

Hydnum coralloides, a rarity first met with two years ago, was again found in its former station at Fairmead, and *Melanospora lagenaria*, a pyrenomycete overgrowing a polyporus on a stump, was a noteworthy find.

Tea was taken at 4.30 o'clock. At the following Meeting, six ladies and gentlemen were nominated for Membership of the Club; after which, the President called upon Miss Wakefield and Mr. F. G. Gould, two of our Conductors, to report upon the day's finds of agarics, while Mr. Ross reported upon the 21 species of myxomycetes which the Foray had yielded.

Votes of thanks to the various Conductors were cordially given, and the party broke up and made its way, in the full moonlight, to Chingford and Loughton stations, happily freed from last year's dread of impending enemy air-raids.

ORDINARY MEETING (493rd MEETING).

SATURDAY, 26TH OCTOBER 1918.

This Meeting was held at 3 o'clock on the above afternoon in the Physical Lecture Theatre of the Municipal Technical Institute, Romford Road, Stratford, the President (Miss G. Lister, F.L.S.) being in the chair. Some 30 Members were present.

The following persons were elected members of the Club:—

Mrs. F. M. Cheesman, 20, Maitland Park Villas, N.W.3.

Miss Dorothy Milroy, 14, Gurney Road, Stratford, E. 15.

Miss Vera Oxley, Kenilworth, Buckhurst Hill.

Miss Kathleen M. Curtis, Royal College of Science, South Kensington, S.W.

Miss Mary H. Thomson, Royal College of Science, South Kensington, S.W.

Mr. A. C. W. Lowe, M.A., F.L.S., Gosfield Hall, Gosfield, Halstead.

The Report of the Club's Delegate to the British Association Meeting, 1918, was read by Mr. William Whitaker, B.A., F.R.S., etc. Thanks were voted to Mr. Whitaker for his communication.

Mr. Thomas W. Reader, F.G.S., then gave a Lecture on the "Plant-life of Past Ages," illustrating his remarks by a large series of lantern photographs and diagrams, and describing the principal features of the

floras of the various geological periods from the earliest-known down to recent times.

Hearty thanks were accorded to the Lecturer.

CRYPTOGAMIC FORAY IN EPPING FOREST (494th MEETING).

SATURDAY, 9TH NOVEMBER 1918.

A gloriously-fine sunny day, following a night of sharp white frost and a thin pearly mist, which imparted delicacy and fairy-like glamour to the forest landscapes, welcomed the party of over 40 Members and friends as they approached their hunting grounds in the Theydon district of the Epping woodlands.

The referees for the day were :—

Mycetozoa . . . The President and Miss A. Hibbert-Ware, F.L.S.

Mosses and Hepatics . . . Mr. L. B. Hall, F.L.S.

Lichens . . . Mr. R. Paulson, F.L.S.

Miss A. Lorrain Smith, F.L.S., who had arranged to be of the Party, was unfortunately prevented by indisposition from attending.

The Party assembled at Theydon Bois station at 11.0 a.m., and proceeded through the village to Oak Hill. A wall-top en route proved a great attraction to the lichen- and moss-hunters, and yielded *Diploschistes scruposus*, *Lecidea lucida*, *Barbula convoluta*, *Grimmia pulvinata* and other interesting treasures. A well-known wayside bank yielded *Bartramia pomiformis* and masses of *Aulacomnium androgynum* with its characteristic gemmæ. Here, too, our President had the good fortune to light upon the uncommon lichen, *Coniocybe furfuracea*, in abundant fruit. Elsewhere, in the Forest itself, masses of the lichen *Bæomyces roseus*, with its conspicuous pink apothecia, literally carpeted the ground.

The route followed was by way of Jack's Hill to the "Wake Arms," and thence to Highbeach, which was reached at about 3.30 o'clock, after a successful and most enjoyable hunt, lunch being taken (and appreciated), by the wayside, the party camping for the purpose amidst the dry bracken.

At the headquarters, the Roserville Retreat, a named display was arranged of the specimens collected, comprising mosses and hepatics, a number of agarics, lichens, and mycetozoa, and informal educational talks on the exhibits were given by the experts.

Tea was taken at 4.15 o'clock, after which a formal Meeting of the Club was held, the President in the chair.

Mr. H. Batchelor, of 12, *Preston Road, Leytonstone, E.11.*, was elected a Member, and three persons were nominated for election at the next Meeting.

The President then called upon Mr. L. B. Hall, who reported that 36 species of mosses had been noted during the day, all of them interesting though none were of outstanding rarity.

Mr. R. Paulson, who was next called upon to report on the lichens, stated that over 20 forms, several of them of considerable interest on account of their rarity, had been met with during the foray. Thus, the President had that morning found *Coniocybe furfuracea*, which had not

been recorded from the Forest district for many years ; the speaker himself had, three weeks before, discovered *Chæonotheca melanophæa*, var. *flavocitrina* an entirely new record for Essex. Other interesting and uncommon lichens, many of them in fine fruiting condition, had been noted during the foray such as *Cladonia digitata* and *Bæomyces roseus*.

Mr. Paulson also called attention to an observation of ecological interest he had made on the soil lichen, *Lecidea uliginosa*, which a year ago was covering in quantity the earth worn bare by the military in the neighbourhood of the Retreat.¹ To-day, on examining the same spot, he found that the lichen had entirely disappeared and its place was taken by moss-protonema and confervoid algæ.

In concluding his remarks, Mr. Paulson referred to the recent publication of Miss A. Lorrain Smith's *Monograph of the British Lichens*, part I., and proposed that a vote of congratulation should be sent to Miss Smith, in the name of the Club, on the appearance of this important and valuable contribution to Lichenology. Mr. Percy Thompson warmly seconded the proposal, which, on being put to the Meeting, was passed by acclamation.

The President announced that 17 species of Mycetozoa had been found during the day. In concluding, she referred briefly, but in well-chosen phrases, to the great national deliverance from a cruel and ruthless War which was on the verge of consummation.²

The meeting then broke up, and Members made their way homewards through the Forest to Loughton and Chingford stations.

ORDINARY MEETING (495th MEETING).

SATURDAY, 30TH NOVEMBER 1918.

This (the second) winter meeting, was held, as usual, at the Municipal Technical Institute, Romford Road, Stratford, at 3 o'clock, the President (Miss G. Lister, F.L.S.) in the chair. 35 Members attended.

Before the business of the Meeting commenced, the President referred, in a few happy phrases, to the great event which had occurred since the last Meeting, to the close of hostilities on November 11th, which presaged the blessing of a speedy and permanent Peace.

Miss May Hargrave, 71, Fenchurch Street, E.C.3.

Miss Winifred Hargrave, 71, Fenchurch Street, E.C.3.

Mr. Wilfred Justus Foster, 1, Cliveden Road, Higham's Park, Chingford, E.4.

were elected Members of the Club.

Miss A. Hibbert-Ware, F.L.S., exhibited and gave a short account of the freshwater sponge, *Spongilla lacustris*, which had been noticed recently in quantity in one of the Wanstead Park ponds. A coloured drawing by the President of the sponge in its living aspect was also exhibited.

Mr. Percy Thompson exhibited a fine polished section of the trunk

¹ See *Essex Nat.*, xvii., p. 282.

² The Armistice which, in effect, brought the fighting to an end, after 4½ years bitter struggle, and yielded victory to the Allies, came into operation at 11 a.m. on the following Monday, 11th Nov. 1918, "a day worthy to be marked by a white stone" in the history of our nation and of all the free peoples of the world.

of a Hornbeam Tree (*Carpinus betulus*), which had been presented to the Museum by Mr. Miller Christy, F.L.S. The specimen had been cut from one of two large spear trees in the Vicarage garden at Writtle, which had been overthrown by the wind-rush of 27 October 1916, as recorded in the *Essex Naturalist*, xviii., p. 139. Another gift to the Museum from Mr. Christy was also exhibited, consisting of several branchlets of Hornbeam from Chignal St. James which illustrated the characteristic growing-together of adjacent branches, which has been referred to as "natural grafting."

The Curator also exhibited a pied cock Blackbird from Great Warley, which had been presented to the Museum by Miss E. Willmott, F.L.S., V.M.H. (described *ante*, p. 14).

Votes of thanks were passed to the respective exhibitors and donors.

Mr. Miller Christy, F.L.S., then read a note on "Hornets, Wasps, and Flies sucking the Sap of Trees," (see *ante*, p. 10). The communication gave rise to considerable discussion, in which Messrs. Nicholson, Main, Paulson, and Elliott joined, as to the cause of gummosis in the trees and the effect upon the insects attracted by the exudation. Thanks were accorded to the author.

A paper entitled "A Whirlwind and Windrush at Gosfield on 26th July 1918," by Mr. A. C. W. Lowe, M.A., F.L.S., was read, in the author's absence, by Mr. Miller Christy, and illustrated by various lantern diagrams and photographs (see *ante*, p. 1.) In the subsequent discussion, Mr. Whipple of the Royal Meteorological Office, who was present by invitation, made some important and interesting comparisons between this particular wind-storm and others of which he had official cognisance.

Hearty thanks were voted to Mr. Lowe for his communication.

ORDINARY MEETING (496th MEETING).

SATURDAY, 25TH JANUARY 1919.

The third winter meeting was held, as usual, in the Physical Lecture Theatre of the Municipal Technical Institute, Stratford, the President, Miss G. Lister, F.L.S., in the chair. Some 53 Members and visitors were present.

Mr. J. J. Holdsworth, 30, *Hamfrith Road, Stratford*, E.15 was elected a Member of the Club.

Mr. William Whitaker, B.A., F.R.S., referred to a Resolution that had been unanimously passed by the Council that afternoon, protesting against the contemplated destruction or partial destruction of the Whitgift Hospital at Croydon in connection with street-widening. On his motion, seconded by Mr. John Avery, an identical Resolution of Protest was carried unanimously.

On the recommendation of the Council, the following persons of scientific eminence were elected Honorary Members of the Club, viz. :—

1. Miss A. Lorrain Smith, F.L.S.
2. Lieut.-Colonel Sir David Prain, C.M.G., C.I.E., LL.D., F.R.S., Pres. L.S., etc., Director of the Royal Botanic Gardens, Kew.

3. Dr. A. Smith Woodward, LL.D., F.R.S., F.G.S., etc.
4. Dr. B. Daydon Jackson, Gen. Sec. L.S., R.N.O. (Sweden), etc.
5. Professor Wm. Bateson, M.A., D.Sc., F.R.S., F.L.S., etc.

Mr. Percy Thompson exhibited a blue Homing Pigeon which had been presented to the Club's Museum by Major Osman, Officer Commanding the Army Messenger Pigeon Service. The bird had been used by the Germans in Flanders during the War, captured by the British, and employed by them, and afterwards brought over to England.

Mr. Avery exhibited and described a series of nineteen old Essex Maps, forming a representative set, of dates ranging from 1575 to 1826.

Mr. R. Paulson, F.L.S., exhibited and presented to the Club's herbarium a fruiting specimen of *Lycopodium clavatum*, collected by him in Epping Forest in 1884. He remarked that the species appeared now to be extinct in the Forest.

Thanks were accorded to the various exhibitors and donors.

Mr. Miller Christy, F.L.S., then read a note "On the Arboreal Habits of Field Mice" (see *ante*, p. 18).

Mr. D. J. Scourfield, F.Z.S., F.R.M.S., read a note "On the recent Occurrence of the Fairy-shrimp, *Chirocephalus diaphanus*, at Epping."

Mr. Hugh Main, B.Sc., F.E.S., read some "Notes on the Life-history of *Nebria brevicollis*," and showed some lantern-slides in illustration of his remarks.

Messrs. R. Paulson, F.L.S., and Percy Thompson, F.L.S., then gave some incidental account of their "Supplemental Report on the Lichens of Epping Forest," the paper itself, on account of its technical nature, being taken as read (see *ante*, p. 27).

The thanks of the Meeting were voted to the authors of the various communications.

VISIT TO THE APARTMENTS OF THE LINNEAN SOCIETY OF LONDON, BURLINGTON HOUSE, PICCADILLY, W. (497th MEETING)

SATURDAY, 15TH FEBRUARY 1919.

Some 40 Members assembled at the Linnean Society's Rooms at 2.30 o'clock in the afternoon, and were received by Dr. B. Daydon Jackson, General Secretary of the Society, who had very kindly consented to exhibit and to give an account of Linnæus's Collections, Herbarium, and Library.

The Linnean Society of London takes its name, of course, from the great Swedish naturalist, Carl Linnæus (1707-1778), ennobled as Carl von Linné in 1761. On the death of the younger Linné in 1783, his mother and sole executrix offered the whole of the Linnean collections to Sir Joseph Banks, who declined to purchase, but advised Mr. James Edward Smith (1759-1828), a young Norwich doctor, then settled in London, to do so. Smith agreed, and the collections and books arrived in London in 1784.

Returning in 1787 from a tour abroad, during which he took his degree of M.D. at Leyden, Smith resolved to establish a Society under the name of the great Swedish naturalist. A meeting was called for 26th February

1788. Seven persons attended the summons at the Marlborough Coffee House, Great Marlborough Street, and the Linnean Society was inaugurated, Smith, the youngest of the company, being chosen President. At the first General Meeting (held at his own house, 12, Great Marlborough Street), on the 8th April, he began a discourse on the "Rise and Progress of Natural History," which he finished on the 6th May.

The place of meeting proving unsuitable, the Society rented two rooms in the President's house in Great Marlborough Street. In 1795, the President gave up that house, and the Society migrated to 10, Panton Square, Coventry Street.

In March 1802, a Royal Charter was granted by King George III. The first General Meeting under the new conditions took place on 1st May; and, before the Session closed, Bye-laws were adopted, in place of the old "Rules and Orders."

The Session of 1805-6 opened in new quarters at 9, Gerrard Street, Soho, but, on the death of Sir Joseph Banks in June 1820, Robert Brown (1773-1858), suggested the removal of the Society to Banks's house, 32, Soho Square, which suggestion was adopted.

During the first 40 years of the Society's existence, the founder, Sir J. E. Smith (who had been knighted in 1814) had been regularly re-elected President, although, having removed in 1796 to Norwich, he attended meetings of the Society only during the two months he usually spent in London each spring; the conduct of the Society devolving, therefore, upon the Vice-Presidents. Smith died early in 1828. By his will, he directed that his collections, with certain reservations, should be offered to the Society for £5,000. After long consideration, the Society was about to decline the offer, when the executor reduced his terms to 3,000 guineas, which offer was accepted. The purchase was effected by selling the whole of the Society's invested funds, by a subscription of £1,193, and by raising £1,150 on bonds at 5 per cent. The debt thus created acted prejudicially in many ways, and was not finally extinguished until 1861.

The chief collections now possessed by the Society are those of Carl von Linné, father and son, Sir J. E. Smith, and a British Herbarium founded upon the collection of N. J. Winch, W. Withering, and others.

The Library of the Society has grown rapidly during its existence, and now contains 40,000 volumes, in addition to the books which belonged to Linné, many of which are enriched by his notes. The Society also possesses many manuscripts of value, and a fine series of portraits. The number of Fellows exceeds 700, with 50 Foreign Members and 25 Associates.

Dr. Daydon Jackson conducted the Party through the various rooms, giving copious accounts of the many objects of interest in the possession of the Society. The oil portraits of Linné, Solander, Menzies, Robert Brown, Darwin, Sir J. D. Hooker, Edward Forster, and numerous other famous botanists who have been associated with the Society; the busts of Linnaeus, Banks, John Ray, and other worthies; the personal relics of Linné, etc., etc., were in turn inspected.

The Linnean collections, books, and herbarium were also exhibited, and the methods adopted to safeguard these valuable possessions against fire and the late danger from air-bombs were explained.

At the close of a most interesting tour, Mr. William Whitaker (in the

unavoidable absence through indisposition, of our President), proposed, and Mr. Percy Thompson seconded, a vote of thanks to Dr. Daydon Jackson for his kindly services during the afternoon. This was heartily accorded by those present, and the visit terminated.

ORDINARY MEETING (498th MEETING).

SATURDAY, 22ND FEBRUARY 1919.

This Meeting was held in the Physical Lecture Theatre of the Municipal Technical Institute, Stratford, the President, Miss G. Lister, F.L.S., in the chair. 40 members attended.

The following ladies and gentlemen were elected Members of the Club:—

Mrs. Lilian B. Pilcher, 122, Windsor Road, Forest Gate, E7.

Mr. A. Capleton, 67, Queen's Road, Leytonstone, E11.

Mr. Frederick W. Hart, 114, Osborne Road, Forest Gate, E7.

Mr. Henry E. Laver, Shanghai, China (c.o. Mr. Philip Laver, F.S.A., 43, Head Street, Colchester).

Mr. Charles F. Pilcher, 122, Windsor Road, Forest Gate, E7.

Major Charles E. Skinner, R.F.A. (on Active Service), c.o. Cox and Co., bankers, 16, Charing Cross, S.W.1.

In anticipation of the approaching Annual Meeting, nominations were made for new Members of Council and Officers for the ensuing year.

The President exhibited and described a three-spurred variety of the larger Butterfly Orchis (*Platanthera chlorantha*, var. *tricalcarata* of Hemsley), from the Club's herbarium, together with several striking examples of Butterfly Orchises from the Himalayas, for comparison (see *ante*, p. 22.)

Mr. Percy Thompson exhibited two old Herbaria and loose herbarium-sheets of plants collected in Stratford, East Ham, Leyton, Woodford, and neighbourhood in 1808 and 1837-38, together with a copy of the *Stratford Flora* (1862), of Joseph Freeman, which had just been presented to the Club's Museum (see *ante*, p. 23.)

Mr. F. J. Stubbs exhibited an adult male Waxwing which was killed by a stone at Abridge in or about 1893. Traces of wax tips to the tail-feathers were evident.

Mr. J. Avery exhibited Chapman and André's large coloured Map of Essex (1777), in 25 sheets.

Hearty thanks were accorded to the donors and exhibitors.

Mr. F. J. Stubbs then read his "Field-Notes on Essex Ornithology," illustrating his remarks by lantern-slides.

A lecture on "Insects in relation to Disease" was then given by Mr. Arthur W. Bacot, F.E.S., which was accompanied by lantern illustrations and by the exhibition of some *Anopheles* by Mr. Hugh Main.

The thanks of the Meeting were passed to the lecturer.

CRYPTOGAMIC FORAY IN HAINHAULT FOREST. 499th MEETING.

SATURDAY, 22ND MARCH. 1919.

In spite of most inclement weather, which included a sharp snow-storm in the middle of the expedition and involved walking through thick mud,

a dauntless party of 28 members and friends assembled at Grange Hill station at 2 o'clock, and proceeded towards the woodlands to the north-east.

En route, the pond on the Recreation Ground at Chigwell Row was visited, and abundance of *Azolla filiculoides* was found floating on the surface. This interesting western American plant has now been observed continuously on this pond since 1904, and seems thoroughly established.

This being the first occasion on which Hainault had been investigated by the Club as regards its cryptogamic flora, some amount of curiosity was evinced as to how it would compare in this respect with its larger neighbour, Epping Forest.

The referees for the day were :—

Myxomycetes . . Miss A. Hibbert-Ware, F.L.S. (in the unavoidable absence of the President).

Mosses and Hepatics . . Mr. L. B. Hall, F.L.S.

Lichens Mr. Percy Thompson, F.L.S.

The actual results obtained were poor ; only 23 mosses, three hepatics, eight lichens, and three " myxies " being noted ; but the climatal conditions under which the search was carried on, and the small amount of ground actually traversed, owing to the waterlogged state of the soil, prevent these meagre returns from being regarded as a true measure of the cryptogamic wealth of Hainault Forest.

The best find was, perhaps, that of the lichen *Cetraria glauca* (= *Platysma glaucum*), which occurred in fair condition upon the trunk of a young ash in the Forest near Chigwell Row. This lichen is known in Epping Forest in one station only, and its occurrence in Hainault is a good record.

The mosses and hepatics found were of forms which are common in Epping Forest, *Fissidens exilis* being one of the most interesting species recorded.

The two specimens of the Mycetozoa which were met with included a fine mass of *Badhamia utricularis* overspreading *Stereum* on a fallen tree trunk, and presenting both its yellow plasmodium and its mature dark-grey sporangia in abundance.

Tea was taken at " The Retreat," on the margin of the woodlands, at 5 o'clock, and was much appreciated by the party, after the physical discomforts of the afternoon.

The homeward journey was made from Grange Hill Station at 6.16 o'clock.

THE ORDINARY MEETING (500th MEETING) AND ANNUAL MEETING (501st MEETING).

SATURDAY, 29TH MARCH 1919.

These Meetings were held at the Municipal Technical Institute, Romford Road, Stratford, the President, Miss G. Lister, F.L.S., in the chair. 56 Members and visitors were present.

Mr. Stanley Austin, 43, *Darenth Road, Stamford Hill, N.16*, was elected a Member of the Club.

Miss A. Lorrain Smith, F.L.S., exhibited a fungus growing on a dead wasp. From the wasp's body, near the head, grew a series of light

ochraceous-yellow stalks of varying lengths, with soft powdery-white heads. Microscopic examination proved the sporiferous filaments to be of a *Penicillium* type, formed into a *Coremium*. As the growth was a new discovery, it was proposed to call it *Coremium swantoni*, after Mr. E. W. Swanton, who found it on Blackdown, Haslemere, Surrey, in March of the present year (1919). The diagnosis of the fungus will be published in an early number of the *Transactions of the British Mycological Society*.

Mr. Percy Thompson exhibited a series of some 46 mounted specimens of Conifers, which had been presented by the President to the Museum.

The Curator also exhibited a fine polished section of the trunk of the Purple Osier, *Salix purpurea*, from Dagenham, which had been presented to the Museum by our Member, Mr. Walter Fox. For comparison, he also exhibited a polished section of trunk of the "Cricket-bat Willow," *Salix alba*, var. *cærulea*, which was given to the Museum some years ago by Mr. Miller Christy, F.L.S.

Mr. J. Avery exhibited an interesting series of old Essex prints which had lately come into his possession, some of which appeared to be very scarce.

Mr. Hugh Main, B.Sc., F.E.S., exhibited, and presented to the Club's Museum, a fine specimen of the old English Black Rat (*Rattus rattus*) which had been caught in Silvertown that morning, in which one of the incisors of the lower jaw had grown upwards and outwards unchecked until it curved past the cheek.

The hearty thanks of the Meeting were accorded to the several donors and exhibitors.

The business of the Annual Meeting was then proceeded with.

The Hon. Secretary read the Minutes of the last Annual Meeting.

The Hon. Treasurer presented his accounts for the year ending 31st December 1918, which had been duly audited. His statement was very favourably received by the Meeting, and, on the motion of Mr. Hugh Main, seconded by Miss I. Lister, the accounts were unanimously adopted by the Meeting, and thanks voted to Mr. Avery.

The report of the Council on the work of the Club during the past year was read by the Hon. Secretary. On the motion of Mr. Stubbs, seconded by Miss Miall, the report was adopted by the Meeting *nem. con.*

The Acting Hon. Secretary announced that Miss G. Lister was willing to serve as President for another year, the announcement being received with general applause.

The retiring Members of Council, Messrs. J. R. Airey, M.A., D.Sc., and A. E. Briscoe, B.Sc., A.R.C.Sc., having been duly nominated at the meeting held on 22nd February, were declared re-elected.

To fill a vacancy on the Council, due to the recent decease of Mr. Ping, Mr. George Morris, B.Sc. was declared by the President to be duly elected.

The existing Officers of the Club, viz.:—Hon. Treasurer, Mr. John Avery, F.C.A.; Hon. Librarian, Mr. F. J. Brand; Hon. Secretaries, Messrs. W. Cole, A.L.S. and Percy Thompson, F.L.S. having been duly nominated for re-election at the meeting held on 22nd February, were declared by the President to be re-elected.

As Auditors for 1919-20, Mr. C. Nicholson F.E.S. (nominated by the

Council), and Mr. C. Bestow (on the motion of Mr. Hugh Main, seconded by Mr. J. Ross), were duly elected.

The Members of the Cole Pension Committee (viz., the President, Messrs. Avery, Christy, Whitaker, and Thompson) were, on the motion of Mr. Nicholson, seconded by Mr. Brand, re-appointed for the year 1919-20.

The President then delivered her Presidential Address, "On Some Water-Plants," illustrating her remarks by lantern photographs and sketches, and by the exhibition of many herbarium-specimens and drawings executed by herself.

Mr. Whitaker moved that the President be requested to allow her Address to be printed in the Club's journal; Mr. Avery seconded, and, on being put to the Meeting, the resolution was carried by acclamation.

The proceedings then terminated.

MYCETOZOA FOUND DURING THE FUNGUS AND CRYPTOGAMIC FORAYS IN EPPING FOREST, 19th OCTOBER AND 9th NOVEMBER 1918

The route taken for the Fungus Foray led from Buckhurst Hill, through Lord's Bushes, down to Connaught Water and the Chingford Forest, and thence by Fairmead to High Beach. Lord's Bushes, with its fine varied woodland, of oak, beech, hornbeam, holly, and birch, on a sub-soil of gravels and clay, proved the richest hunting ground; the uniform clay of the Chingford Forest yielded (as far as our rapid search extended) far less variety. The weather was brilliant after heavy rain on the preceding night, which had probably washed away or injured some of the more fragile species of Mycetozoa.

Twenty species were collected by the efforts of many searchers. Mr. J. Ross, by an early start, had been able to make a considerable collection before the main party assembled.

The most striking specimens obtained were *Badhamia utricularis*, streaming in orange-yellow plasmodium over leathery fungi on prostrate logs; *Diderma floriforme*, found in perfect condition, with pearly-grey unexpanded sporangia, on a fragment of wood, knocked off (probably by deer) from an old oak trunk on which the species had appeared a year previously; *Dictydiæthaliium plumbeum*, forming conspicuous red and clay-coloured cakes on an old log; and *Arcyria ferruginea*, usually an autumn species, and found in an immature stage only, when the serried ranks of club-shaped sporangia were still pale rose-coloured.

The following is a list of the species noted:—

Badhamia utricularis (Bull.) Berk.

Physarum nutans Pers., subsp. *leucophæum*.

Fuligo septica (L.) Gmel.—Old and weathered.

Craterium minutum (Leers.) Fries.

**Diderma floriforme* (Bull.) Pers.

Didymium nigripes Fr.

Stemonitis fusca Roth.—In white plasmodium only.

**Comatricha typhoides* (Bull.) Rost.

C. pulchella (Bab.) Rost.

Dictydiæthaliium plumbeum (Schum.) Rost.

- **Trichia scabra* Rost.
- T. persimilis* Karst.
- T. varia* Pers.
- T. decipiens* (Pers.) Macbr.
- T. Botrytis* Pers.
- Arcyria ferruginea* Saut.
- A. denudata* (L.) Sheldon.
- A. incarnata* Pers.
- A. pomiformis* (Leers) Rost.
- **A. nutans* (Bull.) Grev.

The Cryptogamic Foray was held on 9th November, a day of bright sunshine, following a frosty night. Speaking generally, the party did not stray far from the road leading from Theydon Bois station, past the Wake Arms, to High Beach, though many small excursions were made into the woodland, by those in search of Mycetozoa, to investigate leaf-heaps and prostrate logs. Nineteen species were found, most of them the same as those recorded three weeks before during the Fungus Foray. Those marked with an asterisk in the preceding list were not observed, while fresh additions were *Leocarpus fragilis* (Dicks.) Rost., *Didymium squamulosum* (Alb. & Schw.) Fries., and *Colloderma oculatum* (Lipp.) G. Lister. The last species was found, not on the moist bark of living or felled trees amongst liverworts, where it has often been obtained, but on open peaty ground amongst moss (*Campylopus pyriformis*) and lichen (*Cladonia digitata*). The minute sporangia were immature and white; on being brought indoors and kept moist, they ripened perfectly. The gelatinous envelope, which in this species surrounds the membranous sporangium-wall, seems, while it is moist and plump, to afford an effective protection against the attacks of mould or insects. Sporangia kept wet for two months under a bell-jar were still in perfect condition. Others, which had been allowed to dry, and were later exposed to moist air, became covered with mould.

SOME ESSEX PLANT RECORDS.

BY W. G. CLARKE.

DURING the summer of 1918, I made a detailed study of the fauna and flora of Little Warley Common; and, in addition, I noted the following plants in the other localities named in the vicinity:—

Ranunculus auricomus, Doddinghurst; *R. arvensis*, Bulphan; *Isatis tinctoria*, Shenfield; *Manchia erecta*, Ingrave, Little Warley; *Claytonia perfoliata*, Shenfield; *Hypericum hirsutum*, Langdon Hills; *Malva moschata*, Little Warley; *Ulex gallii*, Little Warley, Upminster; *Trifolium ochroleucon*, Little Waltham; *Lathyrus nissolia*, Upminster; *Pyrus aria*, Shenfield; *Caucalis nodosa*, East Horndon; *Galium tricornis*, East Horndon;

Dipsacus sylvestris, Great Warley ; *Bidens tripartita*, Shenfield, Ingrave ; *Achillea ptarmica*, South Weald, Little Warley ; *Matricaria chamomilla*, South Weald, Little Warley, East Horndon ; *M. suaveolens*, Great Warley, Chelmsford ; *Picris echinoides*, Bulphan ; *Crepis biennis*, Shenfield ; *Lactuca virosa*, East Horndon ; *Hottonia palustris*, Shenfield, Doddinghurst ; *Anchusa sempervirens*, Shenfield ; *Melampyrum pratense*, Great Warley, Little Warley ; *Lamium galeobdolon*, South Weald, Blackmore, Stondon ; *Euphorbia esula*, Shenfield ; *Luzula pilosa*, Ingrave ; *Lemna polyrrhiza*, Ingrave ; *Carex pendula*, South Weald, Margaretting, Buttsbury ; *Alopecurus myosuroides*, Bulphan, Little Warley, South Weald ; *Cynosurus echinatus*, Shenfield, South Weald ; *Melica nutans*, South Weald, Little Baddow ; *Glyceria distans*, Shenfield ; *Lolium temulentum*, Bulphan ; *Ceterach officinarum*, Great Warley.

[Those who wish to compare the floral poverty of Warley Common to-day, as set forth in Mr. Clarke's notes here printed, with its wealth eighty years ago, should refer to an article entitled "A notice of Plants growing spontaneously in and about Warley Common, in Essex," by Dr. Aeneas MacIntyre, published in the *Proceedings of the Botanical Society of London*, in 1839 (vol. i., pp. 16-21), which enumerates many interesting species (701 altogether) and speaks of *Osmunda regalis* as "very abundant" in a boggy wood, otherwise uninteresting, on its eastern side. I call attention to this paper because, though Gibson evidently knew of its existence (see *Flora of Essex*, p. xxii.), he knew apparently nothing of its contents, none of which is quoted in his *Flora*.—ED.)]

Fungus on Stem of Oak Tree.—A very large fungus has flourished for years on the base of the stem of a fair-sized oak-tree growing on a hedge-bank by the side of the road between my house and Chelmsford, and in the parish of Writtle. I have seen it many hundreds of times. It is some eighteen inches across by fifteen inches deep, and it appears to be about six or eight inches through. It grows just on the top of the bank, in a fork of the base of the stem, where two main roots begin to divide. During the summer, it is usually of a rosy or pinky-buff colour ; but, as winter approaches, it takes on a pallid, washed-out, pastey complexion. During summer, too, it exhibits (especially near its lower margin) a large number of deep holes or pores, about half-an-inch across, in each of which stands a large glistening drop of water, apparently of a deep rich brown tint. These drops have, when the sun is shining on them, the bright pellucid appearance of a cat's eye, and render the whole thing strikingly handsome. To some extent, I believe, the water in these pores drips away and is lost ; but it is renewed regularly (no doubt from the sap of the tree), thus always keeping the pores rim-full, until the coming of winter, when, they largely close. In the lower part are a number of bullet-holes, left by someone who has used the fungus as a target for revolver-practice. At the bottom, dead grass has grown through, or become enclosed in, the body of the fungus.

This striking fungus evidently belongs to the genus *Fomes*. I do not recollect seeing another specimen quite like it ; or, at least, not so large.—MILLER CHRISTY, Chignal St. James, Chelmsford.

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[For continuation see over.

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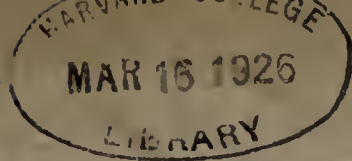
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Vol. XIX.—Part II.]

[JULY 1919—FEB. 1920.]

The
Essex Naturalist:
BEING THE JOURNAL OF THE
ESSEX FIELD CLUB.

EDITED BY PERCY THOMPSON, F.L.S., *Honorary Secretary*,
assisted by
HENRY WHITEHEAD, B.Sc.

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The Authors alone are responsible for the Statements and Opinions contained in their respective Papers.

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**SAMUEL DALE (1659 ?-1739), OF BRAINTREE,
BOTANIST, AND THE DALE FAMILY: SOME
GENEALOGY AND SOME PORTRAITS.**

By MILLER CHRISTY, F.L.S.

With three Illustrations.

IN 1913, I published in these pages some remarks¹ on the lives of the three early Braintree naturalists, John Ray, Samuel Dale, and Benjamin Allen, illustrated by reproductions of the National Portrait Gallery portrait of Ray and the Apothecaries' Hall portrait of Dale.

Immediately after the publication of my paper, our member, Mr. W. H. Dalton, F.G.S., informed me of the existence of what he believed to be another portrait of Samuel Dale, together with two more he believed to represent his first wife and eldest son. Later, in 1916, Mr. Dalton exhibited these portraits at a meeting of the Club, when much interest was expressed in them². Thereupon, the portraits were photographed, and it was arranged that I should describe and reproduce them in these pages.

It appears (from information supplied to me by Mr. Dalton) that, up to about the middle of last century, these three portraits, together with a fourth (now lost), were in the possession of Dr. Perrott, of Braintree. On his death at the period indicated, his representatives selected such of his effects as they wished to retain, leaving the remainder to be sold by auction. The four portraits in question formed a "job-lot" which was purchased by Mrs. Dalton's father, the late Mr. Henry Everard, who lived many years in Braintree. One of the pictures (a portrait of a little girl) was too much damaged to be worth removal, thus leaving the three with which we are now concerned. In due course, the portraits passed into the possession of his eldest son; and they have been, for many years now, the property of the latter's children, Miss Everard and Mr. Arthur Everard, of Witham.

It may be that, when Mr. Henry Everard bought these portraits, he did so because he believed they represented members of the Dale family. Mrs. Dalton remembers her mother

¹ *Essex Nat.*, xvii., pp. 129-138 (1913).

² *Id.*, xviii., pp. 128-129 (1917).

telling her that the lady depicted bore the unusual name of "Judah," thus apparently identifying her with Samuel Dale's first wife, Judah. It was this and certain other facts which gave Mrs. Dalton the idea that this portrait represented Samuel Dale, his first wife, and his eldest son. Further, all the members of the Club who attended the meeting, above-mentioned, at which the portraits were exhibited, accepted the portraits for what they were then supposed to be. It was pointed out that there was a general resemblance between the male portrait and that of Samuel Dale, as depicted on the portrait at Apothecaries' Hall. It was recognized, however, that the first-mentioned portrait was that of a man some 40—50 years younger than the man represented by the latter, painted in 1731, when Dale was seventy-two years of age. The facts that the male portrait displayed a medical work (as does the Apothecaries' Hall portrait of Dale), and that it and the female portrait were painted also (like it) within a large oval, seemed to supply further corroboration. All this, together with the legend preserved in the Everard family, seemed conclusive.

This conclusion was, however, shaken very rudely when, a few months later, I took photographs to the National Portrait Gallery. There they were kindly examined by the Keeper, Mr. J. D. Milner, who at once pointed out that the costumes depicted were not of the date we had supposed, but of about 1775. Thus, it became obvious that the portraits could not possibly represent Samuel Dale, his wife, and his son—a very disappointing result. Nevertheless, as it still seems probable that they represent members of the Dale Family, they are reproduced herein.

Each portrait is painted on a canvas measuring $30\frac{1}{2}$ inches by 25 inches. All are in poor condition—or were so until recently, when the canvasses were "stretched." The painting, though good, seems to be that of some local artist, rather than that of a master. All three portraits are painted within oval borders, which are much too large for the portraits as we have them, the border showing at the bottom only.

The first and most important portrait (fig. 1) depicts a man about thirty years of age, with a serious, but pleasing, expression, and attired in the costume of his period. The right hand rests upon a large upright book, bound in brown calf, with a scarlet

letter-piece, which shows that it is the fourth volume of some bulky edition of the works of the great Greek physician Hippocrates.

The second portrait (fig. 2) portrays, nearly full-face, a plump round-faced lady of about the same age, fashionably attired.

The third portrait (fig. 3) is painted, like the others, within an oval; but the background, instead of being quite plain, consists of trees, through which we get a glimpse of a lake, with mountains beyond. It depicts, about two-thirds length and almost full-faced, a nice-looking youth, about seven or eight years of age. A broad dark-blue sash, passing over his right shoulder, supports at his left hip a drum, on which is painted the Royal Cypher (G.R.) of King George III., surmounted by a large crown in red and white. The lettering on the drum was evidently invisible to the camera.

The question naturally arises :—If these portraits do not present Samuel Dale and members of his family, whom do they portray?

There is now no possibility of obtaining a conclusive reply, but there are known facts which justify a pretty confident conclusion. Thus, the inclusion in the male portrait of a volume of the works of Hippocrates is almost sufficient to establish the fact that the man represented belonged to the medical profession. Again, there is every reason to believe that all the three portraits belong to one another. Further, the fact that the portraits came from Braintree and have been reputed, as far back as we know anything of them, to represent members of the Dale family of that town, is fairly-conclusive evidence that they really do represent members of that family.

These things being as stated, it is natural we should wish to know which particular members of the Dale family we may suppose them to represent. In attempting to solve this problem, I propose to give some information I have recently unearthed. The life-history of Samuel Dale himself has been investigated in part by Prof. G. S. Boulger, but there still remains much that is obscure in connection with both it and the genealogy of his family.

At or slightly before the middle of the Seventeenth Century,

there dwelt, either in the district of Hoxton (then a little to the north of London, but now included in its northern suburbs) or else in the parish of St. Mary Whitechapel (in the East End of London), or perhaps in both successively, the earliest member of the Dale Family of whom we know anything—namely, one North Dale. How he came to be there (whether by birth or immigration), whence he came, when and where he was born, whom he married, and when he died, we are completely ignorant.³ All we know about him is that he was by occupation a silk-throwster (Whitechapel having been for long a chief seat of the English silk industry), and that he had at least two sons, Francis and Samuel.

Francis Dale, the elder of these two sons, was born apparently in 1652.⁴ That he was brought up as an apothecary, we know,⁵ but where he qualified is not known. There are in the British Museum three letters,⁶ from him to the Rev. Dr. Thomas Birch,⁷ an old and intimate friend of the Dale family. They relate mainly to the sealing of certain bonds, and are of no biographical interest. Of Francis Dale also, we know very little, except that, late in 1732, he went to live at Hoxton.⁸ He left two sons—Francis (junior) and Thomas—as well (probably) as a third, John.⁹

This Francis (junior) visited the East Indies, the West Indies, and New Providence (in the Bahamas), whence he sent home, between 1730 and 1732, to his uncle, Samuel Dale, of Braintree, a number of interesting new seeds and plants.¹⁰ It was probably through him that Mark Catesby, the naturalist and traveller,¹¹ became acquainted with Samuel Dale. “To him [says

³ I know not where to search for the registers of Hoxton, which is not a parish, but I have searched those of Whitechapel, which are well-kept as a whole, but very negligently during the Commonwealth, as is usual.

⁴ He was probably that Francis Dale, son of Francis and Joane Dale, of St. Botolph's, Bishopsgate, who was baptized 13th Oct. 1652 (see *The Registers of St. Botolph's*, by the Rev. A. C. W. Hallen, iii., p. 124 : Harl. Soc., 3 vols., 1895).

⁵ In 1723, his son Thomas addressed him (see *post*, p. 53) as “Francisco Dale, Pharmacopeo., multo uso perito, fidelissimo, patri suo optimo, indulgentissimo, omni pietate et amore, quod filium decet, semper colendo.” ([Thomas Dale] To Francis Dale, greatly skilled in the pharmaceutical art, a man of the greatest integrity, a most excellent and most indulgent father, ever to be revered with obedience and affection, as befits a son).

⁶ Sloane MS. 4304, ff. 1-2.

⁷ Thomas Birch (1705-1766), though of Quaker origin, became a D.D. of Aberdeen. He was a dull, but learned, historical and biographical writer; became both F.S.A. and F.R.S. in 1735; and was ultimately, for many years (1752-65), Secretary of the Royal Society. He bequeathed his books and manuscripts to the British Museum.

⁸ See Sloane MS. 4304, fo. 55.

⁹ Samuel Dale, of Braintree, in his will dated 5th August 1738 (see *post*, p. 65), refers to his nephew, John Dale, probably a brother of the two named above.

¹⁰ See Prof. Boulger, in *Journ. of Botany*, xxi. (1883), p. 227.

¹¹ Born about 1679; travelled (1710-19) in North America, collecting plants, &c., and afterwards (1722-26) returned there; F.R.S. (1733); died in London 1749.

Catesby¹²], besides specimens of plants [both dried and growing], I sent some few observations on the country, which he communicated to the late William Sherrard, LL.D., one of the most celebrated botanists of this age, who favoured me with his friendship on my return to England in 1719." Evidently this Francis Dale was the favourite nephew of his uncle Samuel; for the latter, on his death in 1739 (all his own sons being then dead), left to him several valuable legacies, whilst the other nephew, Thomas (the younger brother of Francis), was practically "cut off with a shilling."¹³ In June 1751, we find him writing to Birch from "Hoxton Town,"¹⁴ where he probably spent the rest of his life.

The younger son, Thomas Dale, was born (probably in Hoxton or Bishopsgate), in 1699 or 1700.¹⁵ He became a physician, taking his degree at Leyden 23rd September 1723, when he submitted as his thesis a discourse entitled *Dissertatio Medico-Botanica Inauguralis de Pareira Brava et Serapia Off[icinalis]*, &c., &c..¹⁶ On his title-page, he describes himself as "Anglo-Britannus." At the beginning are addresses to his patrons or introducers—six medical men and botanists, some of them the most eminent to be found in Europe at that day:—namely, Francis Dale,¹⁷ Samuel Dale,¹⁸ William Sherard,¹⁹ Hermann Boerhaave,²⁰ J. J. Dillenius,²¹ and John Martyn.²²

For eight or ten years after taking his degree, this Dr. Thomas Dale lived, apparently, in Bishopsgate, London,²³ where he practised medicine. Further, being an expert linguist, he devoted much time to the translation of important medical works out of Latin and French into English. Thus, in 1729, he translated out of Latin *Emmenologia*,²⁴ by the eminent Dr.

¹² *Natural History of Carolina, Florida, and the Bahama Islands* (two vols., fol., 1731-43), p. v. This is a very sumptuous production, handsomely illustrated by Catesby himself. The name of "Mr. Samuel Dale, M.L." appears in the Appendix, among the "Encouragers of this Work."

¹³ See *post*, p. 67.

¹⁴ See Sloane MS. 4304, fo. 2.

¹⁵ He was described as "aged 50" when he died in Sept. 1750.

¹⁶ It was printed at Leyden, by Henricus Mulhovijs, as a pott-quarto booklet of 20pp. There are two copies in the British Museum.

¹⁷ His own brother (see above).

¹⁸ His uncle; of Braintree (see *post*).

¹⁹ Born 1659; botanist, traveller and F.R.S.; died 1728.

²⁰ Born 1668; a very eminent Dutch physician, practising at Leyden, and a learned botanist; died 1738.

²¹ Born at Darmstadt, 1687; came to England in 1721, on the advice of Sherard; M.D. and Professor of Botany at Oxford; a personal friend of Linneus; died at Oxford, 1747.

²² Born 1699; botanist; died 1768.

²³ See the will of his uncle, Samuel Dale, noticed hereafter (p. 67).

²⁴ Published by T. Cox, at the sign of the Lamb, under the Royal Exchange, London, 1729.

John Freind,²⁵ adding "an Epistle Dedicatory" addressed to Dr. James Douglas, another eminent physician of the day.²⁶ Again, in 1730, he translated out of Latin another learned medical work by Dr. Freind, which he entitled *Nine Commentaries on Fevers, and two Epistles concerning the Small Pox addressed to Dr. Richard Mead*.²⁷ Further, in 1731, he translated, from the French, a work by Father Regnault, S.J., which he entitled *Philosophical Conversations, or a new System of Physics* [&c.].²⁸ To it, Dale added notes and a dedication to Sir Hans Sloane, Bart., another extremely-eminent physician.²⁹ Evidently, even thus early, Dr. Thomas Dale had taken a good position in medical circles in London.

Shortly after, he removed to Charles Town, in the Province of South Carolina, where, for thirty years, he continued to practise medicine.³⁰ The circumstances which led to this removal and the results of it may be inferred from a series of eleven interesting letters (some of them in Latin) from him to Birch, which are preserved in the British Museum.³¹ In one, dated 23rd March 1731-2, we find him on board ship off Deal and outward bound. After farewell messages to various friends, he continues :—

I can only add my hearty wishes for your health and prosperity, and [that] our friendship, contracted in our younger days, may continue to the last period of our lives ; and that, however we may be distant in respect to place, we may not be so in affection.

Later letters show that he had left England under some sort of cloud, and in debt ; also that he had given offence to his father and other relatives, apparently through marrying some lady of whom they disapproved. Among others whom he had offended was his well-to-do uncle Samuel Dale, of Braintree, under whose will, as we shall see,³² he received practically nothing, while his elder brother Francis benefited substantially.

²⁵ John Freind (1675-1728) was yet another eminent physician and writer on medical topics ; F.R.S. (1712) ; physician to the Princess of Wales ; and author of a *History of Physic*.

²⁶ Dr. James Douglas (1675-1742) was highly distinguished as an anatomist ; also as a naturalist, especially a botanist ; F.R.S. (1706).

²⁷ Dr. Mead (1673-1754), yet another leading physician of the day, wrote on the plague. He was a great collector of books, MSS., coins, gems, and the like. Same publisher, 1730.

²⁸ Three vols., 8o, 1731.

²⁹ Sir Hans Sloane (1660-1753), a friend and correspondent of Ray, as of most of the scientific men of that day, became F.R.S. in 1685 and was Sec. R.S. from 1693 to 1712 ; his collections were acquired by the Government and formed the nucleus of the British Museum.

³⁰ I am much indebted to Miss Mabel L. Webber, of the S. Carolina Historical and Genealogical Soc. for information as to his life and standing there.

³¹ Sloane MS. 4304, ff. 46-66.

³² See *post*, pp. 66 and 67.

Yet, in 1736 and 1737, the nephew was in correspondence with the uncle, to whom he sent plants, though they appear to have been poor fragmentary specimens and very badly "cured."⁸³ Probably he was a young man who lacked strength of character in some way, though of high intellectual attainments.

Several letters from him to Birch, partly in Latin and partly in French, written between 17th November 1732 and 19th December 1736 (the latter being the last of the series), are extremely newsy and entertaining:—He had (he says) no cause to regret having emigrated; his prospects were excellent; he was on terms of intimacy with the Governor and officials; his wife had died soon after he had landed, but he was engaged to be married again—to one of the most eligible young ladies in the Province⁸⁴; he hopes in the spring to remit funds to pay his debts; he contemplates writing a History of the Province; he is not yet reconciled to his father, but hopes to become so in time; he was looked upon in the Province as a very learned man; he had begun a new study—that of the Law—having been appointed by the Governor and Council as both a Judge of the Supreme Court and a Justice of the Peace for the Province; he had written a prologue for the opening play at the new theatre at Charles Town; he tells of the great shortage of currency in the Province, rendering it extremely difficult to remit money home; he described the elegance of costume affected by the Colonists, adding "I have grown a greater beau than I ever expected to have made"; he was succeeding in his profession beyond his expectations; and so on.

On 24th May 1737, Dr. Dale very unfortunately lost his second wife, to whom he had been married a short time only. She had borne him three children, none of whom lived beyond infancy.⁸⁵ Eighteen months later, on 26th November 1738, he took a third wife—Anne, daughter of William Smith and Elizabeth (Schencking) his wife.⁸⁶ She survived some four years only,

⁸³ See letters from Samuel Dale to Birch, in Sloane MSS.—ff. 13, 19, and 25. We learn, too, (fo. 15), that in 1736, when the third edition of Samuel Dale's *Pharmacologia* appeared, the nephew had written to know if he could translate it out of Latin into English.

⁸⁴ She was Mary, daughter of Col. Miles Brewton, to whom Dale was married 28th March 1733, at St. Philip's Church, Charlestown (see the Parish Register; also *S.C. Hist. and Geneal. Mag.*, ii., p. 139). To her, in December 1733, Col. Brewton conveyed a house and lot in Church Street, Charlestown (see *S. Carolina Gazette*).

⁸⁵ She died in childbirth and was buried with her child "in one coffin," at St. Philip's Church, Charlestown, on 25th May 1737.

⁸⁶ See *S.C. Hist. and Geneal. Mag.*, iv., p. 24 *et seq.*

when she died and was buried on 28th January 1742-3, at St. Philip's Church.³⁷ Six months later, on 30th June 1743, he was married yet a fourth time—to Hannah Symmonds (or Simons), who survived him.

At some time and place unknown, Dr. Dale published in the Province some remarks on the treatment of small-pox, in which he referred to the views of a certain Dr. James Killpatrick, of Charles Town. These led to the publication, in 1739, of a *Reply* by Dr. Killpatrick, which took the form of a scurrilous and vulgarly-abusive pamphlet of no medical value whatever.³⁸

Dr. Dale became ultimately a Member of the Upper House of Assembly of the Province. He died at Charles Town, aged 50, on 16th September 1750, when he was "esteemed a Man of great virtues, abilities, and learning in general, and in his Profession of Physic in particular. . . ." He "died sincerely lamented by all who had the happiness of an intimate acquaintance with him."³⁹ By his will,⁴⁰ he left all his temporal estate to his wife Hannah; directed that his library was to be sold privately, and not "by public vendue"; and, "as for my *Hortus Siccus* or Collection of Dried Plants, as well as other Natural Rarities, I declare [he continues] that my further will and desire is that they be packed up in a box and sent to my good friend, Dr. John Frederick Gronovius⁴¹, at Leyden, in Holland, to be made what use of he shall think proper."⁴²

Dr. Thomas Dale, of Charles Town, S.C., had, by his fourth wife, Hannah, a son, also named Thomas, born in 1749.⁴³ It appears from the will of his great uncle, Samuel Dale, of Braintree,⁴⁴ that his birth took place in the parish of Bishopsgate, London, but he was probably brought up at Charles Town. He left America, however, at an early age, and was educated at St. Paul's School, in London. In 1770, when a little over

³⁷ See Parish Register and *S. Carolina Gazette*.

³⁸ *A full and clear Reply to Dr. Thomas Dale, wherein the real impropriety of blistering with Cantharides in the first Fever of Small-Pox is plainly demonstrated*: Printed at Charlestown by Peter Timothy, 1739 (48 pp. quarto).

³⁹ See a highly eulogistic obituary notice of him in the *S. Carolina Gazette*, 17th Sept. 1750.

⁴⁰ Dated 27th July 1743, and proved 19th Oct. 1750, in the Charles Town Court of Probate (Book 1747-52, p. 320).

⁴¹ J. F. Gronovius, jun. (1690-1760), of Leyden, was an eminent botanist and a friend of Linnaeus.

⁴² The compilers of the British Museum Catalogue regarded Dr. Dale as *two individuals*—Thomas Dale, M.D., of Leyden, and Thomas Dale, M.D., of Charles Town. They catalogue some of his works under one name and others under the other.

⁴³ Under her will (made 9th April 1751, and proved 26th of the same month), she directs that her three children (Thomas Simmons, Jane, and Francis) shall be sent to their grandfather, Mr. Francis Dale, apothecary, of Hoxton, in England.

⁴⁴ See *post*, p. 65.



HANNAH, WIFE OF THOMAS DALE, M.D., THE YOUNGER ? (1749-1818),
OF LONDON.



ALFRED, SON OF THOS. DALE, M.D., THE YOUNGER ? (1749-1818), M.D.,
OF LONDON.

twenty, he proceeded to Edinburgh, where, five years later, on 12th June 1775, when about twenty-five, he took his degree as M.D. The Latin thesis he presented on this occasion was a treatise on erysipelas, entitled *Disputatio Medica Inauguralis de Erysipelate*.⁴⁵ He is described on the title-page as "Carolinensis Meridionalis, Soc. Med. Edin. Soc." On 26th June 1786, he was admitted a Licentiate of the (London) College of Physicians. Thereafter, until his death, he practised in the City of London. He is described as having been a good classical scholar, acquainted with various European languages, and one of the founders of the Literary Fund. From 1790, for a number of years, he was Honorary Treasurer of the College. He died at his house in Devonshire Square on 21st February 1816, aged sixty-six, and was buried in Bunhill Fields.⁴⁶

This Dr. Thomas Dale (junior), by his will, made 14th January 1815, and proved in London 4th July 1816,⁴⁷ bequeathed to his son, Alfred Dale, his freehold estate in Great Leighs, near Braintree, and directs that his personal property (other than his plate, linen, china, &c., which he gives to his "dear wife"⁴⁸) shall be divided into three parts, one part to go to each of his three daughters, Catherine Sarah, Mary Ann, and Caroline, while he appoints his wife and his son Alfred as his executors. As to what became of the children (the son and the three daughters), I know nothing.

Soon after the death of Dr. Thomas Dale the Younger, his widow and family presented to the Society of Apothecaries of London the portrait of his great uncle, Dr. Samuel Dale, of Braintree, which still hangs in their Hall in Water Lane, Ludgate Hill.

Returning now to Samuel Dale, already mentioned,⁵⁰ son of North Dale, the silk-throwster, of St. Mary Whitechapel, and younger brother of Francis Dale, we find that the place and date of his birth are not known. There is, however, evidence

⁴⁵ It was published as a post-octavo pamphlet of 45 pages, printed at Edinburgh by Balfour and Smellie, of the University Press. There are no fewer than *five* copies in the British Museum.

⁴⁶ See Munk's *Roy. Coll. of Physicians*, ii., pp. 362-363; also *Dict. Nat. Biogr.*, xiii., p. 386 (1888), where he is stated erroneously to have been born in 1729.

⁴⁷ Som. House, Wynne 358.

⁴⁸ As he leaves her nothing else, she was probably provided already with adequate means of subsistence. Her Christian name does not appear.

⁴⁹ It is inscribed on the back:—"Samuel Dale, M.L., 1731. Died 1738; aged 79. Presented to the Society by the Widow and Family of Thomas Dale, M.D., who was his great great nephew, 1816." See also *Essex Naturalist*, xvii. (1913), p. 132 n., where the portrait is reproduced.

⁵⁰ See *ante*, p. 52.

that he was born almost certainly six or seven years later than his brother—in either 1658 or 1659.⁵¹

The earliest fact in connection with him on which we find a definite record is that, when about sixteen years of age, he was formally bound apprentice to learn the profession of an apothecary. Both brothers followed, therefore, the same occupation. It is recorded⁵² that, on 5th May 1674 “Samuel, Dale, son of North: D[ale], of the p’ish of St. Mary Whitechappell, Midd^x, silke throier, [was] ex[amine]d, appr[oved], and bound to Tho. Wells for 8 years:—Fee 4s. 8d.” At the same time, “Tho. Wells, p^d quarterage xs.” Though thus apprenticed through the Society of Apothecaries, he appears never to have taken out his freedom thereof; this being probably unnecessary to him, as he never practised as an apothecary in the City of London.⁵³

About the time of the completion of his apprenticeship, young Dale established himself at Braintree, in Essex, where he lived for the rest of his life. There, for many years, he practised as an apothecary; but, during the last few years of his life (as will be seen), he took a medical degree and practised also as a physician. If he went to Braintree immediately after he finished his eight years of apprenticeship, he must have gone there in 1682; but the Rev. Stephen Newcomen, vicar of Braintree,⁵⁴ in a letter dated 16th March, 1744-5, written to the Rev. Philip Morant, the historian of Essex,⁵⁵ says explicitly:—“Mr. Dale came to Braintree in the year 1680.” This, though two years before the completion of his term of apprenticeship, is probably correct⁵⁶; for his first child was born at Braintree in 1681.⁵⁷

It is worth noting, perhaps, that Dale must have lived actually *in Braintree*, and not, as is sometimes stated, in the

⁵¹ Very probably the date was never recorded formally, for, during the Commonwealth, Parish Registers were kept very imperfectly. We are compelled, therefore, to rely on such other more or less contemporary evidence as is now obtainable. Dawson Turner, in a MS. note (ii., p. 122) in his copy of Pulteney’s *Progress of Botany* (1790), now in the British Museum, says:—“He was born at Braintree about 1658,” which is certainly wrong as to the *place* of his birth. Relham notes (see *post*, p. 65) that he was 81 when he died, which points also to 1658. On his portrait engraved by Vertue in 1737, he is described as aged 78; which points to 1659. In a letter from Newcomen to Morant, written in March 1745 (see *post*, p. 58), the writer says he was 79 when he died; which points to 1660. On the portrait at Apothecaries’ Hall, he is said to have been 79 when he died; which also points to 1660.

⁵² Society of Apothecaries’ Minute Book, fo. 184a.

⁵³ See Prof. Boulger, in *Journ. of Botany*, xxi. (1893), p. 193.

⁵⁴ Appointed 24th March 1709; resigned 1738.

⁵⁵ It is now in the fine collection of Essex material formed by Mr. John Avery, who has kindly communicated to me an extract from it.

⁵⁶ If he was born in 1659, he must have been twenty-one years of age in 1680.

⁵⁷ See *post*, p. 59.

conjoined town of Bocking (with which, however, he was closely associated : see *post*) ; for the births and deaths of all his children were recorded in the Braintree Parish Registers.

Samuel Dale was married twice and had children (apparently six) by his first wife, but all, with one exception, pre-deceased him. Both his wives also died before him. The first wife, whose surname does not appear, bore the Christian name of Judah. He must have married her about the time he settled in Braintree (say, about 1680). The late Rev. J. W. Kenworthy and Mr. H. J. Cunnington, both of Braintree, have favoured me with extracts relating to the Dale family from the Parish Registers, from which I extract the following as to the births and deaths of Dale's children. By his first wife, he had :- ^{57a}

(1) A child (sex not recorded) who was still-born and was buried 15th July 1681.^{57b}

(2) A son, named Samuel (after his father), born 12th November 1683. He died, aged 44, and was buried 2nd August 1727.⁵⁸

(3) A son, named North (after his grandfather), born 12th June 1685. He died, aged ten months, and was buried 8th April 1686.

(4) A son, also named North, born — ? He died, aged —, and was buried 20th September 1698.

(5) A son, named Thomas, baptised, 17th June 1686.⁵⁹ He died, aged four months, and was buried 19th October 1686.

(6) A daughter, named Christian, baptised 6th November 1687, who was still alive when her father made his will in August 1738.^{59a}

Dale's first wife, Judah, having died, he married again, but the dates of both events are unknown. The name of Dale's second wife (by whom, apparently, he had no children) was Sarah Finch. Who she was and whence she came, I know not. By her will (made 1st July 1726, and proved 13th March 1729-30⁶⁰), she describes herself as "wife of Mr. Samuel Dale, of Braintree, apothecary"⁶¹; asserts her good bodily health and soundness of mind; says she makes her dispositions "by virtue of a Deed of Settlement executed by my husband, aforesaid, before my marriage with him"; and gives to her "loving mother,

^{57a} A Priscilla Dale (an entry of whose burial on 6th June 1689 Mr. Cunnington has extracted) may have been a daughter of either *our* Samuel Dale or of his son Samuel, mentioned above.

^{57b} Mr. Cunnington (who does not note this entry) finds another:—1682, 3rd July.—"A still-born child of Mr. Dale, Apoticary." Probably this refers to the same child.

⁵⁸ Another Samuel Dale, buried 2nd February 1730-1, was perhaps a son of this Samuel Dale the Younger.

⁵⁹ See *post*.

^{59a} See *post*, p. 66.

⁶⁰ Proved before the Rev. P. Wagener, Surrogate to the Dean of Bocking. The will (which appears to be in Dale's own handwriting) is at Somerset House. It bears an armorial seal charged with a cross-botony, but I can trace no such coat in connection with any family of Dale or Finch.

⁶¹ This seems to show that Dale had not yet taken a physician's degree.

Sarah Finch, £40, towards her better support and subsistence while she lives," desiring her, on her death, to bequeath any unexpended portion of it to her (Mrs. Dale's) sisters, Rebecca and Jane Finch, to whom also she leaves £80 each, appointing them her sole joint executors.

Dale's botanical work (the chief occupation, other than professional, of his life) has been dealt with already by Prof. G. S. Boulger. From the labels on the plants in Dale's Herbarium, now in the British Museum,⁶² Prof. Boulger has been able almost to construct a Life of Dale,⁶³ following him in his occasional journeys about England, his visits to London (chiefly late in life), and his many short expeditions to Harwich, Sudbury, and other places in the vicinity, undertaken, no doubt, partly with professional, and partly with botanical, objects. That Dale owed his interest in botany directly to his personal intimacy with Ray has been brought out clearly by Prof. Boulger, and Dale himself fully acknowledged his indebtedness.⁶⁴ On the other hand, the pupil was able, as time went on, to render very great services to the master, in the way of collecting and observing plants; and Ray, in many of his works, acknowledges fully his indebtedness to Dale in this respect, speaking of him, even as early as 1686, as "my friend and neighbour."⁶⁵ Dale's standing as a botanist may be judged, to some extent, from the fact that he was one of the seventeen Englishmen to whom a plate (pl. 96) in Michaelis' *Nova Genera Plantarum* (1729) is dedicated. The author, a poor but learned man, had induced 193 botanists throughout Europe (including the 17 English) to support him by subscribing for the engraving of plates for his work, each plate being then dedicated to a subscriber. He had, no doubt, approached Dale through Dr. William Sherard, of Oxford.⁶⁶

But Dale's scientific interests extended to much more than Botany merely; for he took a practical and intelligent interest in the study of many branches of Nature.

Thus, on 8th March 1692-3 (seven years before the publication of the work on English Mineral Springs by Dale's friend and

⁶² See *post*, p. 68.

⁶³ See *Journ. of Botany*, xxi. (1883), pp. 193-197 and 225-231.

⁶⁴ See *Essex Naturalist*, xvii., pp. 157-158.

⁶⁵ *Historia Plantarum*, 3 vols. 10. (1686-1704).

⁶⁶ See Miss G. Lister, in *Essex Nat.*, xviii., pp. 1-2; also *Trans. Brit. Mycol. Soc.*, 1912, pp. 45-47.

neighbour, Dr. Benjamin Allen, of Braintree⁶⁷), we find Dale writing⁶⁸ to one John Houghton, of St. Bartholomew's Lane, in London, an apothecary, and probably an old fellow-student, about a certain Essex Mineral Spring, of which he had had experience, finding its water like that at Epsom, but more active. He does not indicate its whereabouts; but, as he says that it is referred to by Merrett in his *Pinax*, it was probably that at South Weald, near Brentwood.⁶⁹

Again, we find Dale writing,⁷¹ on 2nd December 1693, to Dr. Martin Lister⁷² in reference to conchology. He mentions having called on Lister in London (doubtless with an introduction from Ray), hoping to see his collection of shells, in which hope he had been disappointed, as Lister was not at home. Since then, Dale had sent Lister a copy of "my book" (clearly the first edition of the *Pharmacologia*, then just out) and had received from Lister one of his own works in return. Dale, proceeding, says:—

"For some years past, I have had a curiosity of collecting English shells and have sometimes thought [that], among those I have (which are farr short of what you figure and describe to be of English production), there are some which either you have not mett with or, at least, I cannot make them out to be the same."

Accordingly, he sends to Lister "specimens of all the species I have, of which I beg your acceptance," asking him for the loan of a selection in return.

In Entomology, too, Dale was more or less expert, as we learn from passages in the "Common-place Book" of his neighbour, Dr. Benjamin Allen, whom he sometimes helped in the naming of uncommon insects.⁷³ Again, when Ray died, in 1705, leaving unfinished his great *Historia Insectorum*, Sloane suggested to Dale that he should finish it. Dale's reply was that, so far as English insects were concerned, he felt himself equal to the task, but that foreign species were beyond his powers.⁷⁴

But nowhere is Dale's wide knowledge of natural objects

67 See *Essex Nat.*, xvi., pp. 145-175, and xvii., pp. 1-14.

68 Sloane MS. 747, fo. 13.

69 *Pinax Rerum Naturalium Britannicarum* (1666), p. 220. See Christy and Thresh, *Mineral Waters and Medicinal Springs of Essex*, pp. 12-16 (1910).

71 Stowe MS. 747, fo. 24.

72 Martin Lister (1638?-1712), zoologist, physician; F.R.C.S. (1687); F.R.S. (1671), was a correspondent of Ray. He removed from York to London in 1684. Author of *Historiæ Conchyliorum* (1685-92), with one thousand figures.

73 See *Essex Naturalist*, xvii., pp. 150-151, 155, 163-167, etc.

74 See *Journ. of Botany*, xxi., p. 197.

seen more clearly than in the Appendix he added to his edition of Silas Taylor's *History and Antiquities of Harwich and Dovercourt* (1730: see *post*). Therein, he gives descriptive lists of all the natural productions of the district—the Crag Fossils in the Cliff (pp. 18-19 and 273-326), the Marine Plants (pp. 337-448), the Land Plants (pp. 349-377), the Mollusca, etc. (pp. 377-390), the Birds (pp. 396-409), the Cetacea (pp. 409-419) and the Fishes (pp. 420-438). Dale's appendix and notes made this, for the period, a notable scientific work.

Of the nine articles contributed by Dale to the *Philosophical Transactions* between 1692 and 1732, most dealt with subjects other than botany.

Dale's studies in local archæology and topography have passed hitherto practically unnoticed. Yet they were considerable. Thus, in *The History of Harwich and Dovercourt*, the original author's manorial history, his account of the monuments in the church, and so forth, are all annotated by Dale with knowledge and skill. Further, between 1710 and 1730, Dale greatly helped his neighbour, the Rev. William Holman (1669-1730), the Congregational Minister, of Halstead, in collecting materials for the latter's contemplated "History of Essex." The Rev. Philip Morant, the Essex historian, says⁷⁵ of Holman that "His neighbour, Samuel Dale, assisted him very much and made great improvements [in his matter]." ⁷⁶ Holman's *History of Essex*, the earliest ever seriously attempted, was never published as intended, though his matter was used nearly fifty years later by Morant, as the basis of his well-known *History of Essex* (two vols., folio, 1768).⁷⁷ Had it ever been published, no doubt we should have known much more as to Dale's labours in connection with the matter.

Dale's literary labours, though small in quantity, were of considerable value. His *Pharmacologia* (1693), dedicated to the (Royal) College of Physicians, and the earliest complete treatise on its subject, was in Latin. Later editions, also in Latin, were published in England in 1710 and 1737.⁷⁸ His

⁷⁵ *Hist. of Essex*, i., Preface, p. [1] (1768). See also *Essex Review*, iii. (1894), pp. 261-266.

⁷⁶ There are in the British Museum (Lansd., 814, ff. 68-69) copies of two letters from Dale to Holman dated 30th April and 18th November 1724, both somewhat curt and formal in tone and of no special interest.

⁷⁷ Holman's original manuscript collections still exist, being preserved in part among the Hills Manuscripts in Colchester Castle and in part among the Rawlinson Manuscripts in the Bodleian Library (see *Essex Review*, iii., p. 266: 1895).

⁷⁸ *Pharmacologia, seu Manuductio ad Materiam Medicam, &c., &c.*, third edition, much altered and added to. London: Printed by Wm. Innys and Richard Manby, Printers to the Royal Society, 1737, 460 pp., post 40. Prof. Boulger informs me he has seen an edition, described as "Quinta Editio, ex scripsis Hermani Boerhave," published at Amsterdam in 1751.

next work was his *History of Harwich and Dovercourt* (1730, re-issued in 1732⁷⁹), already noticed. Then come the three papers on miscellaneous subjects, contributed to the *Philosophical Transactions* between 1692 and 1732. Lastly comes a brief sketch of the life of Ray, written in 1737,⁸⁰ which remained unpublished until the last few months.⁸¹

Dale's activities also manifested themselves in connection with local public affairs. He was, for many years, a member of "The Company of Four-and-Twenty," otherwise known as the "Headborough," the local authority which, from time immemorial, had governed the town (still unincorporated). It had a self-imposed Constitution and Rules, a monthly dinner, and a large official pew in the parish church. Dale served it well in all its public offices, acting at one time as its clerk or secretary, as shown by its well-kept minutes in his handwriting. He also made a copy (which still exists) of a book containing local records dating back to early-Tudor times, thinking, no doubt, that it was in danger of being lost or destroyed, as it has been.⁸²

Nor did Dale confine his local activities to secular affairs; for he was equally prominent in religious matters. He was (or became) a strong Dissenter, which renders somewhat remarkable his intimate friendship with Ray, an eminent divine of the Church of England, though for many years together unbeneficed.

During the closing years of the Seventeenth Century, a small Dissenting Congregation was formed at Braintree. Its first minister was the Rev. Thomas Shepherd, formerly a clergyman of the National Church. He came, in 1700, from Buckinghamshire to Braintree, where he ministered for many years, with great success.⁸³ Seven years later, in 1707, the body

⁷⁹ Though styling itself, and always styled, a "New Edition," it was, in fact, no more than a re-issue. The whole of the matter appears to be identical in both, except the title-page, which is slightly different.

⁸⁰ There are references to it in Dale's letters to Birch in the British Museum (Sloane MSS. 4304). It was written apparently on Birch's suggestion. On 4th March 1735-6, Dale writes (fo. 19) that, as soon as he had finished the index to his *Pharmacologia*, he hoped to be "at leisure to oblige you with what I promised about Mr. Ray." But, as late as the end of the following November, it was still unfinished (ff. 25 and 27). By August 1737, however, it had been finished and sent to Birch (fo. 40).

⁸¹ It was printed in *The Essex Review*, xv. (1917), pp. 139-143, where it was ascribed erroneously to "George" Dale.

⁸² See Mr. H. J. Cunnington, in Cunnington and Warner's *Braintree and Bocking* (Lond., 4^o., 1906), pp. 3-5; also Morant, ii., pp. 398-399.

⁸³ He was born in 1665, at Tillbrook, in Bedfordshire, of which parish his father had been vicar. He was a learned theologian, and published various discourses, copies of which are in the British Museum Library. He died 29th January 1738-9 (a few weeks only before Dale himself), leaving several children. He was succeeded by the Rev. Joseph Pitts, who remained four years only, resigning in 1742.

built its first Chapel. This was known as the "Braintree Meeting House" and its Ministers as "the Dissenting Ministers of Braintree." For years (perhaps until his death), Dale held the office of Deacon.⁸⁴

There is evidence, however, that all Ministers of the Church of England in Braintree did not accord to Dale their friendship and toleration, as the great Ray had done; for the Rev. Stephen Newcomen, vicar of Braintree, in his letter to the Rev. Philip Morant,⁸⁵ writes:—"You know enough, I presume, of Mr. Dale's character, as not to launch out too largely in his praise." What there was to lead Newcomen to write so contemptuously of Dale's character, I know not. So far as we know, it was of the highest. Perhaps, with advancing age, Dale had become somewhat crabbed. His portrait,⁸⁶ painted in 1711, when, he was 72 years of age, certainly suggests great determination which perhaps developed later into obstinacy. Probably, however, the sneering tone of Newcomen's reference to Dale is due to nothing more than the bias of one Church of England clergyman writing to another in reference to a prominent local dissenter.

Dale was never a Fellow of the Royal Society, though he was described as such in an incomplete and incorrect obituary notice.⁸⁷

It has been remarked already that, late in life, Dale took a physician's degree—that of Licentiate in Medicine ("M.L.")—in addition to that as an apothecary which he had held for very many years. It is not known, however, by what medical authority, or when, this was granted. Newcomen, in his letter to Morant, states⁸⁸ that "He prescribed as a physician 9 or 10 years before his death, which happened the 15th.⁸⁹ March 1738-9." That is to say, he began about 1729.⁹⁰

84 In 1789, an independent church having been established in Braintree, the older chapel became known (as it is still) as the Bocking Congregational Church. (See *Biographical Sketches of Successive Pastors of the Congregational Church at Bocking, Essex* (Braintree, 8s., 1829; reprinted from the *Congregational Magazine*). In the beginning and middle of the Nineteenth Century, it was attended regularly by many of the leading families of the twin-towns and neighbourhood.

85 See *ante*, p. 58.

86 *Essex Nat.*, xvii., p. 132 (1913).

87 *Gentl. Mag.*, ix., p. 327.

88 See *ante*, p. 58.

89 Should be 18th (see *post*, p. 65).

90 This accords very well with the fact that, in the will of Dale's second wife, made in March 1726, he is described as "apothecary" only; whilst later he was generally described as "M.L.," as, for instance, on Plate 96 in Michaelis' *Nova Plantarum Genera*, published in 1729, and on the portrait in the 3rd ed. of Dale's *Pharmacologia*, published in 1737. Further, Thomas Wright states explicitly (*Hist. of Essex*, ii., p. 25: 1832) that, "in 1730, Dale became a Licentiate of the Royal College of Physicians in London and a practitioner at Bocking, where he died in 1739, aged eighty." It is difficult to disbelieve so positive a statement by a reputable writer, even when he omits to cite a definite authority; but the records of the College (which I have been kindly allowed to see) contain no record of the fact.

The exact date of Dale's death (like that of his birth) has been long in doubt. Until recently, the accepted date has been 6th June 1739, but this is certainly wrong.⁹¹ That he must have been still in fair health in the summer of 1738 seems clear from the fact that, writing to Birch, he speaks⁹² of having been "at your house in July last." Yet the further fact that, in the following month, he made his will suggests that he felt his hold upon life becoming precarious. Anyway, it is certain that he died between this date and April 1739, when his will was proved.⁹³ The Rev. Stephen Newcomen says⁹⁴ Dale's death took place 15th March 1738-9, which is very nearly right. As a matter of fact, it occurred three days later, on the 18th of that month. This is recorded in a memorandum by Relhan, discovered some years ago by Prof. Boulger on a sheet in either the Linnean or the Smithian Herbarium, but since lost sight of:—"Samuel Dale dyed between 3 and 4 of the clock on Sunday morning March 18, 17³⁸/₃₉, aged for this 81 year."⁹⁵

Dale's burial-place, too, has long been in doubt. It has been assumed generally that he was buried at Bocking, in the ground attached to the Chapel, of which he had been one of the founders; but there has been hitherto no definite proof of this, for all the earlier Registers of the Chapel, from 1707 to 1811, have been lost. Some years ago, I searched the grave-yard carefully, in the hope of finding some memorial to him, but entirely without success. Recently, however, Mr. Avery has produced the letter from Newcomen,⁹⁶ in which, writing just six years after Dale's death, he says:—"He was buried in the yard belonging to the Meeting House in Bocking, aged 79 years. There is no inscription or monument for him: only a stone over his wife,⁹⁷ who was first buried there."⁹⁸ This may be regarded as conclusive.

Dale's will,⁹⁹ made 5th August 1738, seven months before his death, and proved (with a codicil dated 17 March 1738-9, the day preceding his death) on 6th April 1739, before the Rev.

91 The error has been due obviously to the misleading obituary notice referred to above.

92 Letter dated 23rd Aug. 1739 (Sloane MS. 4304, fo. 40).

93 See *post*.

94 See letter already referred to (*ante*, p. 58).

95 As to Dale's age, see *ante*.

96 See *ante*, p. 58.

97 Presumably his second wife, Sarah, though *both* wives seem to have been buried in one grave (see *post*, p. 67).

98 Even this stone has now disappeared, so far as I can find.

99 Comm. of London, Essex, and Herts., Bull. 212.

Nicholas Tindal, M.A.,¹⁰⁰ Surrogate for the Bishop of London, shows him to have been of substantial means. He describes himself as "Gentleman," and declares himself of "a sound, perfect, and disposing memory," though "advanced in years, and therefore must shortly put off the body."

All Dale's children having pre-deceased him, except the youngest (a daughter, Christian, aged 53¹⁰¹), and both his wives being also dead, he disposed of most of his property among his nephews (sons of his elder brother Francis), his assistants, and his servants.

First, to his cousins, John Ruggles, of Bocking, clothier,¹⁰² and Thos. Heckford, of Braintree, draper, he gives his messuage in Bocking, in the occupation of Moses Griffith, surgeon, together with all his messuages in Little Leighs, then in occupation of Wm. Drake, Robt. Schooling, and Jas. Shonke, upon trust, for the term of 69¹⁰³ years, for the maintenance of his daughter Christian, should she live so long; the trustees to maintain the premises in tenantable repair; each of them to have 40s. a year for his trouble; and, after the death of Christian, the property to go to his nephew, John Dale,¹⁰⁴ subject to the payment of £10 annually, in two equal portions, to another nephew, Francis Dale,¹⁰⁵ during the latter's lifetime.

To his nephew, Francis Dale, aforesaid, he gives one shilling, to be paid when demanded; he to pay his fair share of taxes, repairs, etc., "so there may be no contention.

To John Dale, aforesaid, he gives his messuage or tenement known as Wigley House, in Ovington, Essex; also certain tenements in the parish of St. Gregory, Sudbury, Suffolk, and a tenement called the White Horse, in Braintree, in the occupation of Francis Little, victualler.

To his servant, Samuel Clapham, he gives a cottage in Braintree, in the occupation of Henry Spooner; also all his

¹⁰⁰ The Rev. Nicholas Tindal (1687-1744) was vicar (1722-40) of Great Waltham and author of the earliest (published) *History of Essex* (1732), of which two parts only were issued (see *Essex Review*, ii., pp. 168-179).

¹⁰¹ See *ante*, p. 59.

¹⁰² A "clothier" was, at the period, a weaver of woollen cloths: not, as now, a dealer in made-up clothing. The woollen industry, formerly of very great importance in Bocking and other adjacent Essex towns, had nearly died out at this date. John Ruggles was a member of the family now represented by the Ruggles-Brises, of Spains Hall, in Finchingfield, a beautiful Tudor mansion some eight miles from Bocking. How he and Thomas Heckford came to be Dale's cousins does not appear; but the fact that they were so explains, perhaps, the reason why Dale, when a young man, began his professional life at Braintree.

¹⁰³ Why 69 years, I know not. Possibly it is an error for 99.

¹⁰⁴ A son, doubtless, of Dale's elder brother Francis (see *ante*, p. 52).

¹⁰⁵ Another son of Dale's elder brother Francis (see *ante*, p. 52).

"frames and other utensils for carding"¹⁰⁶ and £5 "for mourning."

To John Clapham, of Felsted, wheelwright (father of Samuel Clapham), he gives one half of a debt of £41 6s. 6d., which had been owing since 30th October 1716; the other half to go to Samuel on the father's decease and to be secured by bond in double the amount.

To his maidservant at the time of his decease, he gives one year's wages and 50s. "for mourning."

To his nephew, Francis. aforesaid, he gives "my History of Harwich and the third edition of my Pharmacologia, as they are in my library."¹⁰⁷

To his nephew, Thomas Dale,¹⁰⁸ formerly of Bishopsgate, London, but now of James Town,¹⁰⁹ South Carolina, he gives one shilling, and he forgives him a debt and interest of £20, which had been long owing.

To his daughter, Christian, he gives the furniture of his bedroom, except the "buroy"; also "the tea table in the parlour and the furniture therein; and also the six silver tea spoons that are in common use."

To his nephew, William Grey, he gives his wearing apparel and 1/-.

To William Grey's sister, he gives 1/-.

The residue of his estate, after payment of debts, legacies, and funeral charges, Dale gives to his nephew, John Dale, aforesaid, whom he appoints sole executor,¹¹⁰ with "my kinsman, Thomas Heckford, as supervisor; and the latter is to see my body privately buried in the tomb with my two wives, in case my said executor should not be there in time."¹¹¹

The most important bequest Dale made was one to the Society of Apothecaries, to which he left such of his books on botany as the Society lacked copies of; also his own her-

¹⁰⁶ From this, it appears that Dale owned some sort of a business for "carding" (*i.e.*, combing) wool, of which probably this Henry Spooner had been the manager.

¹⁰⁷ This means, of course, the unsold copies of the works mentioned.

¹⁰⁸ Another son of his brother Francis (see *ante*, p. 52).

¹⁰⁹ Probably a *lapsus plumæ* for Charlestown.

¹¹⁰ On 16th Feb. 1769, John Dale having died intestate, his daughter Sarah took out a Commission to administer the will of Samuel Dale.

¹¹¹ Witnesses, Robert Swift, William Whitehead, and Ralph Peers. The long codicil, dated 17th March 1738/9 (the day before Dale's death), varies some of the foregoing provisions, but not to any important extent. It leaves one guinea each to his "servants and assistants," John Clapham, jun., Jeremiah Clapham, Thomas Clapham, and William Bowes. Witnesses, William Rayment, Thomas Sturgeon, and John Yeldham jun.

barium and that which Ray had bequeathed to him on his death in 1705. The wording of the bequest is as follows :—

Also I give and devise unto the Master, Wardens, and Society of Apothecaries of the City of London all such of my Books on Botany as at present they have not, and also all my *Hortus Siccus*, or collection of dried plants, including those collected by my kind friend and neighbour the late learned Mr. John Ray ; upon condition the said Master, Wardens, &c., shall, within twelve months next after my Decease, make or erect proper conveniences in their Physick Garden at Chelsea, in the County of Middlesex, for the Reception thereof, and under such Regulations for the keeping and preserving them as shall be agreed on and approved of by Sr. Hans Sloane, Bart., M.D., President of the Royal Society, London, and my Executor hereafter named.¹¹²

On 21st June (less than a week after Dale's death), at a Court of Assistants (the Master, Mr. Joseph Miller, presiding), it is recorded¹¹³ that

Mr. Isaac Rand acquainted the Court that Sir Hans Sloane had met the Committee for the Garden and declared it as his opinion that it would be most proper to have Dr. Dale's legacy of books and plants kept in a press or presses by themselves, and not mixed with other books or plants ; [whereupon, it was] agreed that the Committee for the Garden provide a proper press or presses for keeping the said books and plants by themselves, and that something be wrote on the said presses denoting the donation.

Now, which particular members of the Dale Family mentioned above may we suppose the three portraits in question to represent ?

I submit that, in all probability (though there is no definite proof), they portray Thomas Dale the Younger (1749–1816), M.D., of London (Pl. I.), his wife (Christian name unknown) (Pl. II.), and his son Alfred (Pl. III.) In that case, the dilapidated fourth portrait, now destroyed, probably represented Catherine Sarah Dale, eldest daughter of this Dr. Thomas Dale (the two younger daughters mentioned in his will having probably not been born at the time the portraits were painted). Dr. Thomas Dale would have been twenty-six years of age, and his son six or seven, in 1775, which agrees very well with the apparent age of the two as represented in the portraits.

There were other members of the Dale Family ; but all

¹¹² The books remained at Chelsea till 1843, when they were transferred to the Society's Library at Apothecaries' Hall. The valuable collections of plants were transferred in 1862 to the Botanical Galleries of the British Museum, where they now are.

¹¹³ See the Minute Book of this date (also Mr. W. Bramley Taylor's *Catalogue of the Library*, edited with an Introduction by Mr. J. Edmund Harting, p. iv.: 1913).

those of whom we know anything were later than the obvious date of these portraits and none of them was a medical man, so far as is known. Thus there was one Robert Dale (perhaps a great-grandson of Samuel Dale), who, after living at Bocking (where, doubtless, he was born), left it as a young man (probably very early in the Nineteenth Century) and removed to London. There he carried on business as a dealer in trimmings for beaver hats, residing successively at a number of addresses in and around Finsbury and Moorfields. He was father of that well-known dissenting preacher, the Rev. R. W. Dale (1829-1895), of Birmingham, who was born in London after his father's removal thither.¹¹⁴

NOTES ON THE FAUNA OF THE NEW RIVER AND RESERVOIRS IN THE LEE VALLEY.

BADGERS, OTTERS, HERONS, WILD FOWL, AND
CARRION CROWS, Etc., WITHIN SIGHT OF
ST. PAUL'S CATHEDRAL.

By J. MACKWORTH WOOD, M.Inst C.E.

(Read 5th July, 1919.)

AS many of the large Waterworks of the Metropolitan Water Board are situated in the Lee Valley in the County of Essex, it will probably interest the Members of the Essex Field Club to know that some of the Mammals and Birds inhabiting the County are resident on these Works and can be seen at any time by casual observers when passing through the Reservoir enclosures within six or seven miles of St. Paul's Cathedral.

During the great flood in January, 1918, a very fine male Badger got into the Chingford aqueduct and was taken out drowned at the weed grate at Chingford Mill. He must have fought hard for his life, as all the toe nails of his front feet were worn entirely down in his attempt to climb the stone walls forming the sides of the aqueduct—it is probable he came from the vicinity of the Forest.

In the Walthamstow Reservoirs are islands covered with brushwood and small trees. On these islands otters are living

¹¹⁴ See *The Life of R. W. Dale, of Birmingham, by his Son, A. W. W. Dale*, pp. 1-2 (Lond., 1898).

their lives unmolested in considerable luxury on fish, which abound in the reservoir.

It is no uncommon sight in the afternoons and evenings to see flocks of stately Herons coming from Epping Forest and Wanstead to wade, fish and feed on the shores of the reservoirs. I have counted as many as 50 around the King George Reservoir majestically wading and fishing for their evening meal, notwithstanding the air has sometimes been full of aeroplanes, of which they take no notice whatever. During the last year or two several pairs have nested on the low trees in the islands of the Walthamstow Reservoirs, but, I fear, with little success. Although these islands are sanctuaries for wild birds and wild fowl, they are infested with Carrion Crows, those rapacious unblushing robbers who rob every nest irrespective of size and species of nearly every bird inhabiting these islands. Although the Heron is a strong and powerful bird, he is no match for these cunning daylight robbers, who sit on the adjoining trees waiting for the Herons to leave their nest, when they pounce down, break and suck the eggs, and turn the shells out of the nest on to the ground. Of all the nests I have visited, shells were to be found on the ground. These Carrion Crows appear to have acquired a habit during the last few years of hunting the rank vegetation on the bank and islands like a dog in search of the wild fowl's eggs, particularly those of the Tufted Duck, instead of searching the rubbish heaps in the neighbourhood for choice morsels in varying stages of decomposition.

During the war Kingfishers have increased considerably, and for the last two years have nested in the river banks broken away by the floods, and it is no uncommon sight to see some half a dozen flitting about like Fire Flies, illuminating the air with their gorgeous iridescent plumage, all in their natural state within a few miles of the City of London.

There are several species of Wild Fowl inhabiting and breeding in the islands and shores of the Reservoirs ; they consist of Wild Duck, Teal, Tufted Duck in great numbers, Coots, Moorhens, Great Crested Grebes, of which there are many pairs, and Lesser Grebes (Dabchicks), besides Peewit and Land Rail, which nest on the banks. At other seasons of the year, especially in winter and rough weather, the waters are visited by flocks of several species of Terns, and occasionally by Dunlins, Redshanks, Oyster

Catchers, Curlews, Snipe, Great Northern Divers, and several other species of Divers, Pochards, Sheldrake, Golden-eyes, Goosanders and several varieties of Geese, Muscovy Duck (probably from London Parks), Little Stint, Dotterel, Golden Plover and Water-rails. Now and then a greedy Cormorant is to be seen fishing.

During the war rod and line fishing was suspended, during which period the fish increased considerably. The fish inhabiting the Reservoirs consist of Pike, Roach, Barbel, Dace, Bleak, Tench, Carp, Eels, Chub, several species of Bream, a few Trout, besides several species of smaller fish. In 1918 some of the Reservoirs were netted for food, but with no great success on account of the depth of water, the varying level of the bottom, and the great growth of aquatic vegetable matter; however, some tons of fish were taken out, among which were some very fine specimens of Bream, Roach, Chub, Perch and Pike. Eels were at one time abundant in the New River and Reservoirs, but for some reason or another that mysterious fish has decreased enormously and also in the River Lée and streams adjoining.

The Reservoirs and streams contain a variety of invertebrates, particularly mussels and snails, but the beautiful Crayfish have entirely disappeared both from the New River, the River Lee and the Reservoirs. I learn, however, from Mr. Tween, Engineer of the Lee Conservancy, that the Crayfish still exists in the Stort by Sawbridgeworth. It was once very abundant in the New River, and died out all at once, undoubtedly from some specific disease. At the same time it disappeared from many of the Rivers in the south of England and particularly the tributaries of the Thames, as I received many applications at the time for New River Crayfish to restock the streams.

ON AN ANNOTATED COPY OF RICHARD WARNER'S "PLANTÆ WOODFORDIENSES."

By PERCY THOMPSON, F.L.S.

(With 4 Plates and 1 other Illustration).

(Read 29th October, 1919.)

BY the courtesy of our Member, Mr. J. J. Holdsworth, I am enabled to exhibit and to give an account of an interesting copy of Warner's "Plantæ Woodfordienses," which is in his possession.

This copy contains both the "Index of the English Names" and the "Index of the Latin Names, as given by Linnæus," which latter, having been printed subsequently to the original publication of the work in 1771, is not found in all copies, and also it includes the "Additions to Warner's 'Plantæ Woodfordienses,'" published in 1784 (after Warner's death in 1775), by Thomas Furly Forster, of whom we shall say more later.

The volume is interleaved throughout with blank sheets of handmade paper bearing the watermark T. FRENCH and a Shield of Arms (quartered) within a circle surmounted by a crown: I have been unable to obtain any information as to the exact date of this mark, which would appear, in the opinion of the experts consulted, to be a rare one.

The entire volume is enriched with numerous manuscript notes of the nature of addenda to or amendments of the original printed text, these being apparently designed by their writer as materials for a projected second edition of the work. This is evidenced by such instructions as "Dele," "add," "insert," by additions to the Index of Latin names (arranged in proper alphabetical order), and, in one case, by the note "this may be erased."

The whole of the manuscript annotations, notwithstanding slight variations, may reasonably be considered as being in one and the same handwriting, having regard to the long length of time over which they extend, viz., from 1784 to 1827: it is evident that during this lapse of 43 years, an originally boyish hand would become formed and matured, and be modified in the process. (Plate IV.)

As to the identity of the annotator, there is abundant internal evidence that the writer collected his plants in, and had an in-

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P. I. A. N. T. Æ

- + RANUNCULUS [parensiflorus] seminibus muricatis, foliis simplicibus laciniatis, acutis, hirsutis, caule prostrato. *Hudsoni* Fl. 212. *Classis* Linnei Polyandria Polygynia. Field Crowfoot with a small flower.

On a bank on the right hand of the lane leading from Clay Street to Higham-Hill Common Field; and in Shernall Street, by the wall of Tony Hall, Walthamstow: uncommon. It flowers in May.

RANUNCULUS recis, foliis pallidioribus hirsutis. *Rail* Sn. 247.

- + RANUNCULUS [bulbosus β] calycibus retroflexis pedunculis tomentosis caule erecto, foliis compositis. *Hudsoni* Fl. 211.

Classis Linnei Polyandria Polygynia. Upright pale-leaved Crowfoot.

In gardens, sides of roads, and on rubbish; in Broome Field, Walthamstow, and elsewhere: common.

It flowers in May.

- + RANUNCULUS scabiolæ capitulo cœruleo. *Rail* Syn. 278.

JASIONE [montana]. *Hudsoni* Fl. 329. *Classis* Linnei Syngenesia Polygama Necessaria. Hairy Sheep's Scabious. In Higham-Hill Common Field: very uncommon.

It flowers in June or July.

SALIX.

poor: on a bank in the lane on the side of Walthamstow-church. 1789. On left hand side of the Lea-wide road going to London, between the 5th & 6th mile-stone, also at the bottom of Clay-street not far from the corner. 1792 (right hand side). Plant fully in the lane leading from Clay-street to Higham-Hill-field May 1801. at the above mentioned place on Dec-ber 23 May 1801.

Have not found any this year. in Shernall St. near the church - L. - - - - - lane by Higham-Hill. 1825. Plants of near Walthamstow, near E. - - - - - 1825.

A root of this found in the common field by the church, Walthamstow, which bore double flowers.

S. montana; on a bank in a field on left hand of Angel-lane, leading from Clay-street to street ford in flower 4 Aug 1816 -

timate personal acquaintance with, the neighbourhood of Walthamstow, rather than of Woodford or other adjacent districts, notwithstanding the nominal title of the book. Most of his localities are thereabouts. We have exact descriptions, and the names of individual occupiers given, as, for example, "Mr. Dixon's wall, Hoe Street," "in Hoe Street by Mr. Agar's palings," "y^e wall belong^s to Tony Hall Shernhall Str.," and so on: whilst such localities as "the lane by our garden," "the Common-field behind our field, i.e. the Church-common field" (elsewhere repeatedly localised as being at Walthamstow), "in our southern field Hoe Street," "our field, Hoe Street," "our field in Hoe-street found 1788," and "in the 4th field from our house in Wood Street," serve still further to locate with exactitude the place of residence of the writer.

Further evidence is afforded by the fact that on one of the interleaved sheets, immediately preceding the printed Preface, the manuscript-writer has given a special

"List of Plants growing in Higham Hill Common field:

Trifolium arvense.

„ *striatum*

„ *agrarium* [*T. procumbens*]¹

Medicago arabica.

Scabiosa arvensis [*Knautia arvensis*]

Jasione montana

Centaurea cyanus

Lathyrus nissolia

Ervum hirsutum [*Vicia hirsuta*]

Ornithopus perpusillus

Caucalis arvensis [*Torilis arvensis*].

Hyoseris minima (sic.) [*Myosurus minimus*]

Papaver argemone

Scandix pecten-veneris

Spergula arvensis

Agrostemma githago [*Lychnis githago*]

Scleranthus annuus

Papaver dubium "

which indicates his special knowledge of, and interest in, that particular locality, again a Walthamstow one.

¹ Names in square brackets give the present day nomenclature, as adopted by the British Museum authorities.

The manuscript annotation to Warner's record of *Clinopodium vulgare*, facing page 38, is as follows :—" C : v : found by E. F. Jnr Aug. 10 1794 in a field near the Oil-mills, bottom of Marshst. I saw it in flower 17 Aug. 1794." This locality is exactly that given for the plant of this species preserved in the British Museum Herbarium (which I have examined), known to have come from Edward Forster's collection.

The foregoing clues, added to the manuscript note opposite the record of *Ranunculus parviflorus* (p. 250), which runs " Plentifully near Waltham Abbey found by E. Forster 1825," lead to the conclusion that the writer and annotator resided in Wood Street, Walthamstow, and was a friend of and fellow-worker with the " E. Forster " mentioned.

It becomes necessary, therefore, to enquire who this " E. Forster " was. Fortunately, his identity is not far to seek.

Edward Forster (1765-1849) was a London banker, a partner in the firm of Forster, Lubbocks, Forster and Clarke, of 11, Mansion-house-street, and resident for many years at Walthamstow. He was the youngest of three brothers, sons of Edward Forster the elder, a successful City merchant, for 23 years Governor of the Russia Company, and Governor of the Royal Exchange Assurance : all three brothers were of botanical tastes and celebrity.

The eldest of the three, Thomas Furly Forster (1761-1825), was born in Bond Court, in St. Stephen's parish, Walbrook, in the City of London, on 5th Sept., 1761, his father being the resident partner of the firm of Thomas and Edward Forster, merchants, of that address. As already stated, he brought out his " Additions to Warner's ' Plantæ Woodfordienses ' " in 1784, and published a " Flora Tonbrigiensis " in 1816 ; he it was who discovered the rare Epping Forest moss, named after him *Zygodon Forsteri*. He was elected F.L.S. in 1800. Married in 1788, in 1796 he went to reside at Clapton and did not return to Walthamstow until 1823, on the death of his mother, where he died on 28th Oct. 1825.

The second brother, Benjamin Meggot Forster (1764-1829), was also born in Bond Court, Walbrook, on January 16, 1764, and in the same year his parents settled at Walthamstow, it is believed in a house known as the Clock House, in Wood Street, which is still standing. The Clock House is a large square

yellow-brick Georgian mansion, with stable outbuildings, standing in its own once extensive grounds on the west side of Wood Street. It contains some fine oak wainscotting. (It is at present in the occupation of the Salvation Army, as a Rescue Home.) Benjamin lived with his parents until their decease, when he took a cottage known as "Scotts," at Hale End and there resided until his own death on 8 March, 1829, thus spending his whole life from early infancy within the limits of Walthamstow parish. His body lies in the old parish churchyard.²

Edward Forster was born in Wood Street, Walthamstow, on Oct. 12, 1765, and spent his boyhood there. In early manhood he lived in St. Helen's parish, Bishopsgate, and married in 1796. After the death of his father in 1812, he returned to Walthamstow (Hale End) and later in life removed to Woodford. He was elected F.L.S. in 1800, and one of the Society's Vice-Presidents in 1828, and served as Treasurer of the Society for 33 years, from 1816 to 1849. An oil-portrait of him by Eddis hangs in the Meeting Room of the Linnean Society. He was also an F.R.S., elected 1821. *Luzula Forsteri*, D.C., is named after him.

Edward Forster died of cholera at Ivy House, Woodford, on 23 Feb., 1849, in his 84th year, and was buried in the family vault at Walthamstow, which, however, bears no inscription to his memory. His herbarium, shortly after his decease, was purchased by Robert Brown, and was by him presented to the British Museum, and is now at South Kensington; his books seem to have been dispersed.

The three brothers worked together in early life in collecting the wild plants of the Walthamstow district.

The book has been rebound at some later time and in the process has suffered by its margins being severely cut down to an extent which has occasionally mutilated the manuscript annotations. A redeeming circumstance is that the occasion of rebinding was taken advantage of to bind in, opposite the reference to *Narcissus pseudo-narcissus* on page 104, where the following MS. note appears: "Saw *great abundance* in Flower

² The Forster tomb in Walthamstow Parish Churchyard is a raised stone altar-tomb, enclosed with tall iron railings, in the N.W. portion of the churchyard. The inscription upon its north face is as follows:—Benjamin Meggot Forster, Esqre./born in St. Stephen Walbrook London 16th January 1761/resident in this parish nearly the whole of his life/died at Hale End 8th March 1829/also Mary Jane wife of Edward Forster Esqre/of Woodford in this County/born 11th July 1763 died 14th January 1815./

in a field by Mrs. Moyers house, Leyton April 1799, also some in a field at the back of Leytonstone May 1799 in Fl. Have doubts whether ever found actually wild," a commentary on blue paper, written and signed by William Pamplin,³ but not dated, which runs :

" N.B. About 1780 or perhaps a little later my Grandfather and my Father wrought in the Garden of this Mrs. Moyer at Leyton—and my Father has frequently mentioned the circumstance here referred to by Mr. Forster—viz., this particular field was completely overrun by quantities of the Common Daffodil and moreover that in labouring to eradicate them as ordered by his employer he has often left off work with his hand sorely blistered. Also he has told me that he had supplied from this source specimens for the Forsters when they first began collecting for their Herbaria in boyhood."

Here, then, we have direct evidence that to William Pamplin's knowledge one of the three brothers Forster was the author of the manuscript annotations.

G. S. Gibson tell us, in his " Flora of Essex," 1862, that when, in 1843, he conceived the idea of compiling this work, he wrote to Edward Forster on the subject. Forster replied that he had himself collected considerable materials for such a Flora, and was in process of arranging them. Indeed, Forster informed him that he had, at one time, entertained the idea of printing a second edition of Warner's " Plantæ Woodfordienses." But Gibson assures us that after Edward Forster's death no " prepared manuscript " was found among his papers, although elsewhere he speaks of " manuscripts of the late Edward Forster containing botanical memoranda extending over a period of more than sixty years." As a matter of fact, Edward Forster published nothing in separate form.

I have examined, by favour of Dr. Rendle, a selection of Edward Forster's plants now merged in the General British Herbarium at the British Museum (Natural History), and there can be no reasonable doubt that the handwriting on the herbarium

³ William Pamplin (1806-1899), a native of Chelsea, was, during his earlier years, in partnership as a nurseryman with his father at Chelsea, his father having formerly carried on a similar nursery business with his father at Walthamstow. At the age of 33, William undertook a botanical bookselling business at 45, Frith Street, Soho, and published among other works, Sir W. J. Hooker's " Species Filicum," in 1846 and Gibson's " Flora of Essex," in 1862; in the latter year he retired to North Wales, where he died some 37 years later. He was an indefatigable botanist, and was for 69 years an Associate of the Linnean Society. His autograph (dated 1830), occurs in a copy of Deering's " Catalogus Stirpium," 1738, in the Club's Library.

He it was who gathered the rare fern, *Cystopteris alpina*, from Leyton in 1835. (See *post*).

sheets is identical with that of the manuscript notes we are considering ; and there is marked agreement, and in some cases absolute identity, as to localities, between the plants contained in the herbarium and those marked " w.h." in the manuscript notes as being " in my Walthamstow herbarium." Indeed, the British Museum officials have not hesitated to date certain of their herbarium specimens by means of the information furnished by these manuscript notes.

Many of the MS. records are undated, especially those which are evidently the earlier ones ; in this respect agreeing with the specimens in the Forster Herbarium, which never bear a date. A dissection of the *dated* records shows that these are practically continuous from 1784 to 1815, the only gaps being for the years 1790, 1798, 1800, 1802, and 1813. After 1815 the blank years become more numerous, there being records for only 1819, 1821 and 1824 ; but in 1825 a recrudescence of energy supervenes, and that year has eleven separate notes to its credit, while 1826 has one note, and 1827 the concluding three notes of this long maintained annotation.

The year most prolific in observation is 1801 with 15 notes, and next comes 1808 with 13 notes. The year of Edward Forster's marriage (1796) sees no interruption of the observations, nor do the deaths of his father in 1812 and of Thomas Furly Forster in 1825 cause any cessation of the records. They cease in 1827, two years before Benjamin Meggot Forster's decease.

I have had considerable difficulty in deciding which of the three brothers was responsible for the annotations. All three were of botanical pursuits, all were associated in collecting plants, all lived and worked together during their younger years.

The eldest brother, Thomas Furly, may be soon ruled out of the question. As we have seen, he left Walthamstow in 1796 to reside at Clapton, and did not return to Walthamstow as a resident until 1823 ; and he died in 1825 : whereas, the annotations are numerous during the years of his absence, and they continue for two years after the date of his decease. It is therefore conclusive that, notwithstanding his earlier association with Warner's work in the publication of the " Additions " of 1784, Thomas Furly cannot be the author of the manuscript notes.

To decide between the two younger brothers was more difficult. On the one hand, Edward's claim in a letter to G. S.

Gibson, written in 1843, to have intended to print a second edition of the "Plantæ Woodfordienses," and the MS. note of certain plants marked "w.h." being "in my Walthamstow herbarium," and the proved fact that these specimens are included in the herbarium at the British Museum formerly in the possession of Edward, seem to point to him as the author of the annotations. But, on the other hand, Edward Forster was married in 1796, and lived in London until after his father's decease in 1812, and so his opportunities for making continuous local records during this period would seem to be doubtful: and it is surely significant that after the death of his brother Benjamin not one single annotation was added during the whole twenty years in which Edward survived alone. So, too, the distinction made in the notes themselves (on *Clinopodium vulgare*, already quoted) between "E.F. Jnr." and the "I" of the writer implies two personalities.

Lastly, we come to Benjamin Meggot, who, as we have seen, was a life-long resident of Walthamstow. Notwithstanding the MS. note "in our southern field Hoe Street Aug. 1808," a date when he only of the three brothers was living with his parents in the Walthamstow home, Benjamin's claim to the authorship of the annotations would, in the absence of any known example of his handwriting, have been incapable of proof, for although Benjamin supplied specimens for "Sowerby's English Botany," which are now included in the British Museum herbarium, these unfortunately do not bear his handwriting, but that of Sowerby.

In considering the rival claims of the two brothers, I had recurring suspicions that Benjamin, and not Edward, was the writer of the MS. notes: but proof was lacking. Fortunately, I discovered in the Club's Library autograph signatures of both Edward Forster and Benjamin Forster, on the fly-leaves of books formerly in their possession and since presented to the Club (in 1895) by the late Dr. M. C. Cooke⁴; and additional evidence was forthcoming later. I found, on looking through the Smith Correspondence in the possession of the Linnean Society, one solitary signed letter from B. M. Forster to J. E. Smith,

⁴ In Lyons' "Fasciculus plantarum circa Cantabrigiam nascentium," 1763, there is the autograph signature "Edward Forster junior, 1803," in Hopkirk's "Flora Glottiana," 1813, is the autograph "Edward Forster," and in John Ray's "Synopsis methodica stirpium britannicarum," 1724, the autograph signature "B. M. Forster 12th September 1814." Reproductions of these are appended. (Fig. 1.)

Walthamstow 23 October 1862

Dear Sir

I hope we may conclude that by this time your complaint in your face, is nearly if not entirely well, for we have for some time past ^{heard} from Mr. Towerly and other of our acquaintance, of your amendment - I suppose you have heard that Mr. Bellwyn is going to reside in Wales. I think his work on *Conferve* is likely to be delayed on that account, for he will I imagine be very much engaged in business - I shall be obliged to you at your leisure if you will inform me whether the Fungi part of your *Flora* is likely to be sent to press this winter, as I am looking over "English Fungi" and making such remarks as occur to me, which when done I intend sending to you, as perhaps some circumstances may occur to me which you may overlook. The figures in the work are certainly in general very good, but Mr. Towerly falls short very much

LETTER FROM BENJAMIN FORSTER TO J. E. SMITH

(Reproduced by permission of the Council of the Linnean Society.)

in the Letter press for as he has not attempted a specific character, he should have given some tolerably full, description. I fear he has figured the same individual under different appearances, two or perhaps, three times - Mr S. has I believe the following works on Fungi which you no doubt can easily borrow of him -

Batch - *Elenchus Fungorum*
 Boltens - *History of Fungi* &c
 Persoon - *Books several*
 Bulliard - *Champignon de France*
 Schaffers *Fungi* &c

I hear that the *Flora Londinensis* is bought by Mr Sam^l Curtis, (of the Estate of Mr Curtis) whether he means to publish or sell the copy-right I know not -

Begging to be remembrance to Mrs Smith and the rest of your family.

I remain

Yours sincerely

B. H. Forster -

15 M. Forster. Oct. 23. 1862
 And. 1. Oct. 11.

written from Walthamstow in 1802: this letter, by permission of the Council of the Society, I have been allowed to photograph and to reproduce in *facsimile*. (Plates V. & VI.)

I have thus been able to submit the manuscript annotations to a close criticism from the point of view of penmanship, and as a result I have become fully convinced that the writing is the writing of Benjamin Meggot Forster and not that of Edward Forster. I do not propose to go into details, but I may call attention to the shaping of the capital letter F, the small letters f and k, the figures 8 and 4, and the habit of placing a colon where most people would put a simple dot, as features which are common

B. M. Forster.
12th Sept^r 1814.

Edward Forster
1802

Edward Forster

FIG. 1.—AUTOGRAPHS OF BENJAMIN AND EDWARD FORSTER.

to both Benjamin's letter and signature and to the manuscript annotations, whilst there is no such correspondence with Edward's writing.

It was then Benjamin Forster who collected the plants and who formed the herbarium, referred to as "my Walthamstow herbarium," now included in Edward Forster's Collection at the British Museum, and who wrote the MS. notes. When Benjamin died, in 1829, his surviving brother must have inherited his effects, including his herbarium and the annotated copy of Warner's "Plantæ Woodfordienses," and these, twenty years later, at Edward's own decease, were wholly attributed to him

as the best, or only, known member of the family. I am glad to be able, after the lapse of nearly a century, to render this tardy justice to Benjamin's memory.

Benjamin never married ; he seems to have been of a retiring disposition, living his life in the then rural surroundings of Walthamstow, content to pass his leisure time in collecting and arranging his loved specimens, less obsessed by the claims of business life than either of his two brothers, the successful merchant of Threadneedle Street, and the opulent banker of Mansion-house-street ; though it may be presumed that he too had his part to play in the conduct of the merchant house of Edward Forster and Sons, of 38, Threadneedle Street, and later of 6, St. Helen's Place.

After Edward Forster's death in 1849, the book not improbably was acquired by William Pamplin, who had it rebound and at the same time inserted his own blue-paper observation as to the Daffodils : but there is no actual evidence as to this.

In June, 1863, it came into the possession of the Rev. Tullie Cornthwaite, M.A., of Walthamstow, whose few marginal notes, of no special botanical value, written in a neat angular sloping hand, are easily distinguishable from Benjamin Forster's irregular script.

The Rev. Tullie Cornthwaite was vicar of the new district church of St. Peter-on-the-Forest, Walthamstow, in 1848, and resided on the Forest, facing the Snaresbrook Road, in the house now known as "Oakhurst." He was a benefactor to Walthamstow in that he set up an iron pump on the Forest for the use of the inhabitants, at the corner of College Place, just outside his own residence, the broken base of which may still be seen : the much worn stone landing before the Pump is a mute testimony to its usefulness at a time when no public water supply was in being. Cornthwaite survived until 1878, and lies buried in St. Peter's Churchyard.

Tullie Cornthwaite presented the volume, about 1872, to Henry Ford Barclay,⁵ whose autograph, like that of Cornthwaite, appears on the flyleaf.

Its subsequent history is simple. Henry Ford Barclay died on November 12, 1891, and, fifteen months later, on February

⁵Henry Ford Barclay, D.L., J.P., of "Grove House," Grove Lane, and afterwards of "The Limes," Shernhall Street, Walthamstow, and later of "Monkhams," Woodford Green, a member of the Epping Forest Commission of 1871 and a Verderer of the Forest.

21, 1893, the book was offered to Mr. Holdsworth through the trade, and purchased by him for a small sum.

Coming now to the manuscript notes themselves, these record no great botanical rarity, except in the case of *Cystopteris alpina*, to be mentioned later.

Forster's *additions* to Warner's records are as follow :—

Lysimachia nemorum, found "in the woody part of the Forest, not far from Hagger-lane, in one spot in plenty. Also found in woody part of Forest near Kings Oak, Highbeach, in flower 25 May 1801."

Hypericum elodes, found "on a Bog near Highbeach in abundance, not in flower, July 1793."

Campanula [*Wahlenbergia*] *hederacea*, found "on bogs near Highbeech, Epping-forest, July 1793." Forster adds, "Abundance in flower this day 16 July, 1801, in 3 bogs by the Kings-Oak, Highbeach—it grows some way out of 2 of the bogs, especially one, amongst the fern there." "In flower by the Long bog opposite King's-Oak Mond, 22 August, 1808."

Cardamine hirsuta, recorded as growing "in the Sale Hale-end by the ditch-side 1789," and also "in several places by the brook which runs from Fairmead bottom to Chapel-end."

Alisma ranunculoides (no locality given).

Anthemis arvensis, "found in May, 1786, in Mark-house Common-field," also "in abundance in a field between Chingf^{ld}-lane and Chingford-hall-lane, gth abund., 1794."

Equisetum fluviatile [*E. maximum*] found in a "ditch by side of a field at the back of Snaresbrook on the forest."

Equisetum limosum, found in ditches also in stagnant waters "in the marsh ditch N. side Lea bridge road and elsewhere."

Serapias latifolia [*Helleborine latifolia*], "found on an hill called the Hawk, near Chingford green, also near the Bald Faced Stag in the wood," and further "a root of this found near the spot at Hale end where the *Ophrys nidus avis* was found; 26 May 1788."

Hieracium pumilum [*H. villosum* ?] (no locality given).

Linum usitatissimum, "found in Mark-house Common field," also "one plant in fl. edge of foot-path, on Lea-br-rd, beyond Gardiner's-house, 20 June 1808."

Rubus idæus, growing at the "east corner, Snaresbrook pond, May 5, 1789."

Arenaria marina [*Alsine media*], recorded as occurring in "Plaistow-marsh, abundantly, 1796."

Thlaspi arvense, "found in the Garden at the Grove, West-ham." This was the residence of Mr. Thomas Williams, whose daughter Susanna had married Benjamin's elder brother Thomas in 1788.

Tragopogon porrifolius, "found one plant in the field on right-hand Lea-bridge-road, next the present Nursery-ground, yesterday, 15 June, this morning went into the field and gathered one flower, and another not blown. Friday 16 June 1809."

Mentha gracilis [*M. gentilis*], found "at the edge of the River at Higham-Hill. This I called *M. vegeta* before Sole published it as *M. gracilis*."

Myagrum sativum [*Camelina sativa*], "one specimen found this day amongst corn in the Church Common-field, Walthamstow, in fl. and pod, 22 June 1805."

Iberis nudicaulis [*Teesdalea nudicaulis*], "found this day 25 May 1804 on the Flat of the Forest, between Wansted and the Ilford Road not far from opposite the road which leads to East-ham, found a great many plants. Some in flower and some stems with pods." Forster adds: "I looked for it 25 April 1825 but did not find it."

On the other hand, Forster deletes Warner's record of *Alcea* (sic) *vulgaris*, which he stigmatises as "a mistake for ye *M[alva]moschata*," the Musk Mallow, which is, he adds in MS., "not uncommon in meadows," and notes that this plant occurred "in our southern field Hoe Street Aug. 1808 in Flower." Similarly, he rejects Warner's record of *Asperugo procumbens* as being "a mistake for the *Lycopsis arvensis*," which he notes as growing "in the Lane leading from Angel-lane to Maryland-point."

He comments on Warner's record of *Fagus castanea* [*Castanea vulgaris*], the Sweet Chestnut Tree, as growing on the Forest near Wanstead House, that these trees are "planted in rows."

Forster accuses his predecessor of an act of botanical vandalism in removing a rare plant from its natural habitat; he comments upon Warner's record of the Royal Fern (*Osmunda regalis*) as found on the side of a gravel-pit behind Mr. Moxon's House, thus "This I hear was taken away by Mr. Warner"! But the accuser is himself not above reproach in such matters, seeing that he admits, in the case of *Rhamnus frangula*, that he "brought home a shrub of it from forest between Whips-Cross and Wanstead. Th: 7 May 1807. "But Forster was not a vandal, since in 1808 he found several plants of *Ophrys spiralis* [*Spiranthes spiralis*] and he adds "I took up one specimen, left believe seven"; and again he records that he "found Sund. 4 Aug. 1799 several (about 12) plants [of the Wild Larkspur, *Delphinium ajacis*] in the Common-field behind our field, i.e. the Church-common fld.—in flower—brought home 8 for specimens." These two rarities, it is interesting to note, are duly present, from the exact localities described, in the Forster Herbarium at the British Museum.

In the case of certain of Warner's local records, as *Asperula odorata*, *Asplenium Ceterach* [*Ceterach officinarum*] and *Scabiosa*

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PLANTÆ

On walls and rubbish, on the old walls about
Waltham Abbey: uncommon.
It flowers in May and June.

F.

- + *FILIX* mas non ramosa, pinnulis angustis, raris
profunde dentatis. *Raii Syn.* 121.
POLYPODIUM [*Filix femina*] fronde bipinnata:
pinnulis lanceolatis, pinnatifidis acutis. *Hud-*
soni Fl. 389.

Classis Linnei Cryptogamia Filices.
Female Polypody, or Fern.

In shady places: on the east side of Snaref-
brook Pond among the bushes: very uncommon.

- + *FILIX* saxatilis caule tenui fragile. *Raii Syn. p.*
125.

POLYPODIUM [*fragile*] fronde bipinnata, fo-
liolis remotis, pinnis subrotundis, incis. *This is the most common.*
Hudsoni Fl. 390.

Classis Linnei Cryptogamia Filices.
Fine cut Stone Fern with slender and brittle
leaves.

In a wall before Mr. Story's house, in the lane
leading from the Lea Bridge Road to Leyton
Church: very uncommon. Several specimens 1787
1794

FUMARIA alba latifolia. Raii Syn. 353.
FUMARIA

See English Botany No under the
name of *Gyathum incisum*
taken from specimens from the Wall mentioned
Many plants on the wall, both
sides the gate: 21. Aug. 1874.

columbaria Forster comments dubiously "have not found this," or "never found this" or "have not seen it in this neighbourhood." Against Warner's record of *Turritis glabra* [*Arabis glabra*] he places the comment, "never found this in this neighbourhood, doubt its being found in this place."

Forster indeed expresses doubts as to the validity of many of Warner's local records; his criticisms are as follow:—

Acer pseudo-platanus, "not wild."

Betula alnus [= *Alnus rotundifolia*], "not wild probably."

Acorus calamus. "No doubt planted both places. Believe this plant not to be a native of England."

Antirrhinum orontium. "Have doubts whether this has ever been found wild in this neighbourhood." "It is possible this may have been one met with in some cornfield."

Antirrhinum majus, "probably not indigenous in these parts."

Asplenium ceterach [*Ceterach officinarum*], "probably not wild."

Atropa belladonna, "doubt this having been found wild."

Buxus sempervirens, "nowhere wild probably."

Campanula glomerata. "doubt this having been found in this neighbourhood."

Vinca major, "doubt this being wild hereabouts," but notes at a later date, "Plenty on the left hand side of the road leading from Inks Green to Chingford Hatch very near Ch. Hatch, in the Hedge, apparently wild one flower 19 June 1821."

Polypodium dryopteris. "Doubt this."

Fumaria capreolata. "Doubt this."

Inula helenium. "Doubt this being found wild."

Centaurea scabiosa. "Doubt this having been found." °

Juniperus communis. "Wild quere?"

Mercurialis annua. "Doubt this being found wild."

Narcissus pseudo-narcissus. "Have doubts whether ever found actually wild."

Nymphæa lutea minor. "Probably planted originally."

Onobrychis sativa, [*O. viciæfolia*]. "Do not believe wild."

Sanicula europæa. Whilst admitting its occurrence "in the woods," Forster places double? ? in the margin against Warner's record of this plant as being "found in the road between Walthamstow and Lee Bridge."

Chrysosplenium oppositifolium. "Doubt this being found here."

Sedum reflexum, "not wild."

Sedum acre, "not indigenous."

Sempervivum tectorum, "not indigenous."

Senecio viscosus. "Doubt this having been found wild."

Sorbus aucuparia [*Pyrus aucuparia*]. "Not wild."

Tanacetum vulgare, "escaped or thrown from gardens I suppose."

Tilia europæa [*T. cordata*]. "Not actually wild."

Valeriana dioica, "do not believe found wild."

Verbascum nigrum. "Doubt this being wild. Never found this in this neighbourhood."

Viola hirta. "Never saw this wild—doubt its being found here. This may be erased." Later, however, Forster himself records this plant "in flower, in a field on the right-hand side of the Lane leading from Hale-end to Chingford Hatch, opposite the Larks, several plants, 16 April 1826."

Solidago virgaurea. "Suspect this an error."

Myrica gale. "Planted no doubt."

Convallaria multiflora [*Polygonatum multiflorum*]. "Planted probably or escaped from some garden."

Against the printed record of *Polypodium fragile* [since recognised as being *Cystopteris alpina*, Desv.], growing "in a wall before Mr. Story's house, in the lane leading from the Lea Bridge Road to Leyton Church," Forster comments: "This is tho't not to be *P. fragile*. See English Botany No. [163] under the name of *Cyathea incisa*, taken from specimens from the Wall mentioned." He notes "several specimens 1787, D^o 1794." and "Many plants on the wall both sides the gate 8th Aug^t 1814." (Plate VII.)

This last record deserves further comment, on account of its unique character. The Alpine Bladder Fern was admitted into the British flora on the strength of its occurrence on the wall at Leyton and nowhere else in these islands. Sir W. J. Hooker records (in his "British Ferns," 1861, where he gives a plate [Plate 24] of the species) that Edward Forster took him early in the 19th century to see the plant growing in its one station, and confirms its identification as *C. alpina* and notes that it was "*apparently* wild"; but at the same time gives as his verdict "there is too much reason to suspect that it had been planted." Gibson in his "Flora of Essex," 1862, remarks in his preface: "*Cystopteris alpina* has been admitted into the British Floras from an Essex station, but it has no claim to be reckoned a native plant": and elsewhere (p. 398), he states that "a MS. note, apparently written by T. F. Forster about 1778, in the "Plantæ Woodfordienses," is the earliest known notice of it." The MS. note referred to is of course one afterwards printed in T. F. Forster's "Additions to Warner's 'Plantæ Woodfordienses'" of 1784, and cannot be the MS. notes of Benjamin Forster which we are now considering, and which are, of course, subsequent to the publication of the "Additions." Before Gibson's time the wall at Leyton had been demolished and the one habitat

of this rare fern destroyed: specimens were, however, gathered from it as late as 1840.⁶

Forster's records are now perhaps rather of topographical or antiquarian importance than of botanical value. Some of the more interesting may be appended. He notes the occurrence of

Artemisia absinthium "in the field between Mark-house and Mr. J. Hibberts garden, 1808."

Asplenium adiantum-nigrum "on a wall on the south side of melon ground late Mr. Bowles's, Wanstead, in great abundance, 3rd Oct., 1821," also "on a wall Capworth street, S. side of street, N. side of y^e wall."

Allium vineale "in the marsh on the N. side of y^e Lea-bridge road, also in a field opposite the wooden foot bridge, also in a field next Wood-street leading to y^e forest from y^e church."

Sedum telephium "found in a field on the left hand side of Angel-lane leading to Stratford," also "on a bank left hand above lane, 1807."

Arum maculatum "sometimes found with a yellowish white spadix, but much most commonly (sic) with a purple one."

Berberis vulgaris "in Capworth street."

Chenopodium rubrum "in Green-leaves-lane. In lane leading into Broom-field or Mark-house Com-fld. 1808."

Butomus umbellatus. "Marsh ditch near Lea-bridge right-hand going towards London, July 1793 in fl. Plaistow-marsh Aug. 1796, fl. In fl. Aug. 18th 1808, in river Rhodon in grounds behind Wanstead going from Hylands to Illford. In the Lake on right hand of road leading to Stratford-road, also (in abundance) in flower in marsh below Plaistow 4 Aug. 1814."

Carduus Marianus [*Silybum Marianum*] "on a Bank just at y^e entrance of Higham-hill-com.-fld., at the N.E. corner, 1794."

Centaurea calcitrapa. "Plaistow Marsh abundance, Aug. 1796."

Dianthus armeria "in a wood on the left hand of the lane leading from Clay street to Chingford—in lane leading from Chingford lane to Chingford Hall, in fl. Aug. 1808."

Lathyrus nissolia. "In Higham hill-Com-field; also in the 4th field from our house in Wood-street."

Caucalis [*Torilis*] *nodosa* "under garden wall Toney-hall 1793."

Cichorium intybus "in abundance in road, from entrance of Waltham-Abbey, leading to Epping. in fl. Aug^t 1808."

Conium maculatum "hedge in Mark-house-com.-fld."

Circæa lutetiana "by the ditch on the r^t hand of the lane leading from Hoe street to the church commⁿ fld."

Clinopodium vulgare "found by E. F. Jnr Aug. 10 1794 in a field near the Oil-mills, bottom of Marshst. I saw it in flower 17 Aug. 1794."

Damasonium stellatum [*D. alisma*] "found in several ponds on the Forest."

⁶ The Club's cryptogamic herbarium contains a single specimen of *Cystopteris alpina* recorded as from "Leyton, Essex," without date

Dipsacus pilosus "little beyond Waltham Abbey towards Nazing, in hedge in abundance Aug. 22, 1808."

Geranium [*Erodium*] *cicutarium*. "In Angel-Lane, leading from Low-Leyton to Stratford in fl. 11 May 1807 left hand of road on a bank," also "Several plants (in flower) near the Bason and elsewhere in Wansted Park June, 21, 1801."

Hedera helix. Forster notes of the "very flourishing tree of it, against the east end of Chingford Church, 2 feet 7 inches in circumference," described by Warner, as follows, "this fine specimen of Ivy was killed by the severe frost in the winter of 1783-4."

Salvia verbenaca "several plants in Wdfrd c.y. 1787," also "in tolerable plenty some way out of Barking on left hand of Road leading to Rumford, May 1811."

Iris fœtidissima. "In Green-leaves lane which leads from Marsh str^t to Clay street Walthamstow."

Daphne laureola "under an hedge in Chingford Lane."

Linaria cymbalaria "on a wall in Ham-lane, 1784," "also great abundance on garden-wall Upton Westham, late Dr. Fothergills also garden-wall Clay-street, Walthamstow, Mrs. Reads—not wild."

Menyanthes trifolia[*ta*] "on a bog on the forest between the Assembly row and Wanstead."

Mentha piperita "in a ditch in Hoe street. Ditch near the end of Wood Street on the Lea-bridge r^d, 1792."

Nepeta cataria "grows apparently wild in a hedge between Mark-house-lane and Marsh street nearly opposite Mr. Hall's—by the roadside July (in flower) 1801," also "near Waltham-Abbey."

Ophioglossum vulgatum "in our Field in Hoe Street found 1788," also "found May 1789 in the marsh on y^e North side of the Lea-bridge-road. same marsh 29 May 1811."

Orchis [*Habenaria*] *bifolia* "on the Forest opposite Paradise row."

Orchis mascula. "Sale Hale-end."

Orchis latifolia "on the Bog near Salters buildings. also in the Marsh on the N. side of Lea-bridge road."

Petasites vulgaris [*P. hybridus*]. "At Westham near the Abbey-Mills."

Scolopendrium vulgare [*Phyllitis scolopendrium*]. "Ditch bank in a field between Woodford and Woodford-bridge-road 25 July 1826 same place where I saw it many years ago."

Plantago media. "Found one plant at the side of the Lea-bridge-road beyond the 5 mile stone, Sat. 14 Sept. 1799."

"One plant in *Flower* (and believe more plants) in Wansted Park, near the Ch: Sund., 15 June 1806."

"one plant in flower, on bank right hand Lea-bridge-road, between 5m.s. and Gardiner's house July 1812."

Linum radiola [*Radiola linoides*] "on the Forest not far from the 6 mile-stone Lea-bridge road."

Drosera rotundifolia "on the bog on the forest, between the Assembly-row and Wanstead."

Asplenium ruta-muraria. "On a wall on the right hand of the road going from Layton green thro' the Town."

Sambucus ebulus. "Upton Lane probably thrown or wheeled out of Dr. Fothergills' Garden."

Serratula tinctoria. "By Snaresbrook Pond."

Taxus baccata. "A small plant of it in the woods not far from the Sale-gate by the Royal Oak," also "Two small plants of it in the Hawk June 1788."

Asplenium trichomanes. "On a wall at the end of Wood-street near Whips-cross, also on a wall in the garden of Mrs. Moyer, Low Layton."

Trifolium fragiferum "in plenty in the right hand Marsh (North), not far from Lea-bridge, in flower, 13 Aug. 1801."

Verbena officinalis. "Found with white flowers, in Shernallst 1825."

Vinca minor. "In the Lark, plenty in one spot."

Ophr [*Listera*] *ovata*. "In Mr. Nor is's tithe field or orchard, saw this several years ago (1793)."

Fumaria [*Corydalis*] *claviculata*. "Left hand in wood Holly-bush-hill Wanstead or near, 1825."

Mentha gentilis "several plants I found this afternoon by a ditch near a small ozier-ground higher up (eastward) river than Bolton's-Ferry, not far from the River. they grow by the Plank bridge. Friday 3^d Aug. 1827."

Adoxa moschatellina. "Plenty in a field by the Rivulet between Hale-end and Chaple end, also in a wood between the same places. In that wood plenty in Flower 25 April 1825."

Ophrys [*Neottia*] *nidus avis*. "Found one specimen near the same spot" [i.e. as recorded by Warner, near the Royal Oak, Hale End], June 2nd 1786 also one other the same month, one specimen found in the wood called the Hawk 14 June 1787 found in the same place 1788."

Jasione montana. "on a bank in a field on left hand of Angel-lane, leading from Leyton to Stratford in flower 4 Aug. 1814."

Samolus valerandi. "In Plaistow Marsh 1804."

Sium arvense [*Petroselinum segetum*]. "On Bank Hagger-Lane near Turning to Hale End." "On Bank of Hagger-Lane by Hale-Brinks near upper end of the Lane 29th July 1824." "Three plants April 1825, at corner of Hagger-Lane, turning to Hale End." "Near Chingford Church on the banks under the hedges."

Trifolium subterraneum. "on a slope, near the front of Wansted-House in the Park, in flower June 1801."

In considering these records we have constantly to bear in mind the great changes which have taken place in the neighbourhoods concerned. The plants recorded tell of meadows, corn-fields, and country lanes where now rows and rows of "unlovely streets" evidence the forward sweep of the great metropolis.

Even so late as 1861, an enthusiastic local writer, whose prophetic vision was surely less remarkable than his native piety, says of the Walthamstow of his day:—

"To those then who are anxious to know what will be the future of Walthamstow, we reply that Walthamstow—with its fertile soil and fruitful fields, its stately cedars, its wide-spread

elms and forest flowers, its green meadows, its sweet-scented may and flowering chesnuts, its healthy atmosphere, its pleasant landscapes, its advantageous position near the capital of the world—all proclaim to us the fact that the Divine Being has munificently surrounded us with blessings, and that it ought and might be one of the happiest and most prosperous villages in our isle.”

But times are changed. The Forest remains : and sufficient old elm trees still stand elsewhere to show that Walthamstow was once a well-wooded district : but those other glories—its cornfields, its lanes, its “ pleasant landscapes,” its noble Georgian mansions—are either gone entirely or persist in name only, or are converted to other modern uses, undreamt of in the old days when Benjamin Forster culled wild flowers in its lanes and fields.

A FEEDING PLATFORM OF THE WOOD MOUSE.

By CHARLES NICHOLSON, F.E.S

(Read 29th October, 1919.)

AT the end of my garden [at Hale End] runs an open pale fence, covered with a thick growth of wild clematis, and on the north side is a hawthorn hedge in which some years ago I placed an old kettle for the benefit of our robins, of which they have taken advantage every year until the present. I did not clear the remains of the nest out of the kettle until very late last year, and glancing at it one day during the winter I observed that the kettle had been entirely filled up with “ old man’s beard,” or the feathered fruits of the clematis. Suspecting the reason I commenced to pull out the material, and almost immediately four beautiful little wood mice shot out one after the other, ran swiftly down the hawthorn stems to the ground, and disappeared. I then emptied everything out of the kettle on to the ground and left it.

Some weeks afterwards I discovered in the hedge about two feet above the kettle, a bird’s nest, which I had not previously noticed, and on getting up to inspect it found that it had been filled up with clematis fruits and was sprinkled with seed husks

7“ Walthamstow : Past, Present and Future,” 1861, p.78.

and the droppings of mice. I at once recognised that it was one of the feeding-platforms referred to by Mr. Christy in the paper he read before the Club on the 25th January last.¹ As it was not convenient to remove the platform at the time, I left it and forgot all about it, so that it remained in the hedge until last August, when I cut it out. The seeds and droppings had by then been washed away by rain, but I exhibit it to-night for what it is worth.

[Mr. Nicholson has presented the specimen to the Club's Museum. Ed.]

1 ESSEX NATURALIST, xix, p. 18.

FIELD NOTES ON ESSEX ORNITHOLOGY.

By FRED J. STUBBS.

(Read 22nd February, 1919.)

WITH ADDITIONS.

(*With two Plates.*)

THE following notes on Essex ornithology are based on observations made during the past ten years in that part of the county lying south of a line drawn from Harlow to the Blackwater. At one time or another, from 1909 to 1919, all parts of this area have been visited; but, on some occasions, the object of such excursions has been other than ornithological work. In going through my notebook I find that many of my records, interesting enough to myself, are too trivial for publication here—they contain nothing new, of county interest at any rate; some have already been published elsewhere, with little or no mention of the actual locality where the observations were made; and not a few of my minor discoveries have cancelled themselves after my recent careful reading of Mr. Miller Christy's two chief publications on the ornithology of the County¹, which, I need hardly add, have been freely used during my residence in and near Essex.

Best acquainted with a northern avifauna, I find Essex to be extremely rich in terrestrial birds; but, on the contrary, my success with aquatic species has been remarkably poor. More than once I have spent a whole day on some desolate marshland of the southern or eastern coast of the county without meeting

1 Birds of Essex, 1890, and "Birds" in the Victoria Hist. Essex, vol. I, 1902.

a single bird worthy of a field-glass; and, on inland waters, I have been distinctly unfortunate with the vagrants which elsewhere have been so often the reward of such rambles. Yet, in a way, these wild marsh districts of Essex have a mysterious charm of their own. One spends a day in their muddy labyrinths, getting few plants or insects, seeing no interesting birds; and, in the evening, one leaves them with a sense of puzzled enjoyment, noting the places for further visits and re-visits.

The REDWING, I find, sings frequently during its stay in the county, but is extremely shy during the performance. The song has a close resemblance to the confused chatter of a flock of the Starlings that so often occupy the same trees, and this fact, which so often conceals the Redwing's song from the casual observer, may well be used instead as a clue.² The 1915-16 winter was remarkable for a great scarcity, both of this bird and of the Fieldfare, but on the night of the 25th March 1916 I noticed a considerable movement of Redwings between 8.0 and 9.0 p.m., a dozen calls being heard during a hundred yards' walk. At Theydon Bois, in 1917 and again in 1918, we had the experience³ of a cock BLACKBIRD coming daily to spar for hours at a time with its own reflection in a neighbour's window.

In 1918 a SONG THRUSH reared two broods from one nest in my porch at Theydon Bois.

The WHINCHAT nests annually on the railway side at Theydon Bois—and of course elsewhere in other parts of the county; I have often seen the adult birds, and noted the peculiar grating or jarring voice of the fledglings.

In 1916 my attention was drawn to the extraordinary rarity of the GOLDCREST in various parts of England, and since that year I have not seen an undoubted example, nor have I heard its note. Unfortunately, I failed to remember if I had, or had not, seen the bird in its old breeding haunts in Essex in 1916. In previous years it had been under daily notice. Late in 1918 my wife reported a doubtful example in the Forest, and I heard what may have been the note a few days later. On 29th Dec. 1918 we both watched, at close quarters, a Goldcrest in the Forest. I was, however, puzzled by the unusual voice—a sound,

² *Zoologist*, 1911, p. 361.

³ Not unprecedented; T. A. Coward, *Mem. Manchester [Lit. and Phil. Soc., vol. 59 1915], No. 7.*

naturally, not quite so familiar as it used to be. Not until late in the evening did the idea of FIRECREST occur to me ; and, as it happened, we had not been able to get a good view of the head plumage. It is quite possible that a closer examination of this bird would have proved it to be a Firecrest, and not the first of the returning Goldcrests. The record is thus a doubtful one, and at the moment of writing I have not met with an undoubted Goldcrest, either in Essex or elsewhere.⁴

The WOOD WARBLER was abundant in Epping Forest in 1918, and so indeed were the other warblers (especially the Lesser Whitethroat) in the western corner of the county ; but the NIGHTINGALE, round Theydon, seems decreasing, although there was a distinct rise in numbers in 1918.

About midnight on the 29th May 1919 a NIGHTINGALE was singing in the hawthorn hedge at the extreme eastern end of the Forest at Theydon Bois. There was no moon, and the night was dark and still. What would happen, I thought as I stood near the bush, if I struck a match ? At anyrate I would try the experiment. The sudden light illuminated every leaf and tuft of blossom near my face, but there was no halt in the song ; and by moving my hand and head I could see the bird, very ghostly in his khaki plumage, shivering in the ecstasy of his song.

One after another a dozen matches or so were ignited and burned away, and through all this time there was no break in the song. The bird, I estimated, was about thirty inches from my eyes, and (so far as I could tell) was utterly oblivious to the light. Its back was turned towards me, the head turning slightly from side to side, so that I could see first one eye and then the other. With the hope of touching the bird, I tried to penetrate into the bush, but at the first rustle the Nightingale stopped singing, and did not start until I had remained perfectly still for a couple of minutes. I struck a final match, had another look at this strange minstrel, and then walked home.

Will all Nightingales act in the same way when illuminated ? What would be the effect of a bright electric pocket-lamp ? It should be possible, by means even of a match, to focus a camera on a singing Nightingale, and then take a flashlight photograph at close quarters.

⁴ On October 19th 1919 we saw a small flock in a fir plantation on the Lancashire coast.

The REED WARBLER nests rather freely round Mr. G. Buxton's pond at Birch Hall, Theydon Bois, and I also know the species at Passingford Bridge. Otherwise, I agree with Mr. Christy that it is rare in inland Essex.

The GRASSHOPPER WARBLER occurs annually at Passingford Bridge, the strange little song being sometimes uttered at midnight in June.

It is a common experience, in winter, to find cracked and emptied hornbeam fruits wedged into crevices in the rough bark of oak or hawthorn. By the end of February, in Gaunt's Wood, Theydon Bois, I found that almost all of the thousands of fruits which strew the ground are fractured. I suspect the GREAT TIT as the agent in the work on the ground, for it is the species most often seen searching (in a very pretty manner) amongst the dead leaves. *Probably* it is also responsible for the wedged fruits. The NUTHATCH is a conspicuous native of the wood, but in winter it appears to be entirely insectivorous here.

On the 9th May 1912 I got an excellent view of a WHITE WAGTAIL at Curtis Mill Green, my only experience of this species in Essex, although I have met with it in other counties. It was extremely wild, and probably a migrant, for I saw the bird finally take flight to disappear in the distance. The general Tern-like coloration and slightly different voice were well-marked, and separated the bird at once from the Pied Wagtails in the locality. The latter bird, during winter, has the habit of roosting in great flocks in the reeds at Birch Hall, and on the 13th March 1916 I counted 150 at this place ; and, two years later, I record "double this number."⁵

Colonies of breeding TREE SPARROWS have been noted in the Mardyke valley (where they were nesting in buildings) ; near Rainham, and near Abridge. On 23rd March 1919 I saw a flock of about 200 near Ongar, unaccompanied by the usual House Sparrows or other finches.

The song of the BULLFINCH may be heard by anyone who devotes a little attention to this abundant Essex bird. It is so very subdued as to be inaudible at the distance of more than a score of yards, and some of the details of the melody cannot easily be heard at half this distance.

⁵ The Pied Wagtails, to the number of 100 or more, were still returning to the pond each night up to the 15th June, 1919.

The HAWFINCH is unquestionably abundant in Essex, but still evades most eyes, although its ravages amongst our peas are evident enough. Occasionally a bird will throw off its traditional shyness, and I have followed one around the garden, watching it feeding on the path, or flying like a sparrow to the safety of the chimney top to await my going.

An unexpected habit of the REED BUNTING in Essex has already been recorded.⁶ The birds pass the winter days consorting with finches in the drier parts of the Forest; and, I find, they congregate to roost in such places as the reedbed at Birch Hall, sleeping here by scores or hundreds. But during the past two seasons their numbers have decreased, and on the 27th January 1918 only one or two were noticed, in company with hundreds of Pied Wagtails.

The MAGPIE, fairly common near Southminster, and occurring in regular but small colonies around the Willingales, has been represented in the Roding Valley, below Ongar, since the summer of 1918 by a single bird. Some years ago I directed attention to the curious "marriage ceremonies" of the Magpies as observed on the Pennines⁷, and, in Essex, have tried to identify the same habits in the JAY. But the latter bird is most difficult to watch, and up to the present I can do no more than express my belief that the business of the restless parties of Jays met with in the Forest from December to February is on a parallel with the "ceremonies" of the Magpie. I understand that the habit has been observed in reference to the Jay on the Continent; and Macgillivray gives a note relating vaguely to the Hooded Crow. So far I have not had the chance of searching the literature of the subject, but I recommend the careful watching of the Forest Jays in winter. What are they doing at this season? Obviously not migrating, and as obviously neither feeding nor fighting, nor engaged in preparations for nesting; yet, at the same time, these noisy, restless congregations have some important bearing on the life of the birds.

The CARRION CROW is so very much like the ROOK that the two species are often confounded, even by professed ornithologists and in public museums. I do not know of any English work which gives *adequate* descriptions of these two birds, but

⁶ Trans., London N.H. Soc., 1916, pp. 8, 20, 93, 96.

⁷ British Birds, iii, p. 334.

several Continental ornithologists have pointed out an "infallible" test in the wing formula, and one that I have used in doubtful specimens during the past few years. In the closed wing of the Rook the second primary is longer than the sixth, and in the Crow the second primary is shorter than the sixth. In 1918 my friend, Mr. H. G. Taylor, pointed out that the young Rook, as shot for the table (when of course it is most liable to be mistaken for a Crow), has the wing formula of the Carrion Crow. I soon proved this to be quite correct; for, it appears, when all the other primaries are well-grown, the critical second primary of the Rook is only half-developed. This little detail seems well worth further and closer study.

On the 19th May 1918, while Mr. Taylor and I were watching the NIGHTJARS in the Forest at Theydon Bois, we saw a male bird "churring" on a dead branch; and after a few moments, it flew down and settled on the ground near its mate, calling without a break during the whole of its journey. While on the wing the note was soft and musical, a bubble rather than a rattle (reminiscent, perhaps, of the voice of the female Cuckoo), changing to a dull churr while the bird was on the bare ground. This was my first experience of a Nightjar churring in flight; and, indeed, from a considerable experience of the bird, I had doubted if it ever did occur. In the present instance we had an excellent view of the whole performance, and saw it repeated, in almost full daylight—the time being 9.0 p.m. (8.0 Greenwich time). Is it possible that this bird calls both with the inspiration and the expiration of its breath? The cadence of the note is connected with obvious movements in the trachea, visible by the "swelling" of the throat: the trachea, of course, is a rigid tube, and cannot swell, but I use the common expression denoting the alteration in length of the windpipe.

It is now well-known that the male CUCKOO utters his familiar call with closed mandibles—sometimes, however, I have seen them separated by about $\frac{1}{8}$ of an inch. In 1912, near Albyns, I was lucky enough to have a female bird in the field of my glass when it uttered its note, and I saw that she called with wide-open beak, as does the young Cuckoo, but although I cannot imagine any possibility of error, I would like again to see the note given, or to hear of the observations of others who have seen the female Cuckoo in song. If established, it will be a curious

sexual difference. Adult Cuckoos are very bad birds to watch.

July Cuckoos are perhaps worth record. In 1912 we heard the male at Noak Hill on the second, and on the same date in 1918 I heard both the male and the female at Theydon. It is possible that a male (isolated by his persistent tri-syllabic call from the other males) and a female cuckoo near my house were actually paired in 1918 and 1919. The general opinion is that this bird does not pair.

On the 4th May 1918 I saw and heard a WRYNECK at Birch Hall, my only record for the district—and, indeed, for the county, so far as my own observations are concerned.⁸

In 1911 I thought it wise to direct attention (in "Nature" September 14th, 1911), to the regular campaign against KINGFISHERS near London. In August of that year a well-known collector, by means of the deadly "Kingfisher-net" caught altogether twenty-two birds on a short stretch of the Ching Brook near Woodford. He actually offered me nine, and was advertising the birds alive at one-and-sixpence each. Most of them died in a few days, and several of their carcasses reached my hands. I took prompt steps to put an end to the business, and mention it now merely as an illustration of the real status of the bird in the county. The collector is now dead. He told me that all these Kingfishers were taken on the same side of the net, a fact which proved that each had been following the stream in a southerly direction.

A note on a so-called "luminous Barn Owl," which we encountered at Hainault, appears in the "Zoologist" (1914, p. 399). I considered that the white plumage reflected the moonlight, and was not phosphorescent.

The LITTLE OWL is still an irregular visitor to Theydon Bois, although common and increasing in many other parts of the county. Near Shonk's Mill, near Willingale, and in the woods behind Purfleet, it is often the most noticeable bird in an autumn or winter walk, as noisy by day as it is by night. I have seen a Little Owl perched on the telegraph wires in broad daylight, calmly watching the noisy passage of a train a dozen feet away.

On several occasions, in winter, the PEREGRINE has been

⁸ A Wryneck was reported for this district on 25th April, 1918. Trans. L.N.H.S., 1918, p. 32.

seen—one near Great Wakering on the 31st December 1909 passing quite close to me as I sat at the edge of the sands ; I cannot trace the dates for two others seen near Tilbury (1910) and Woodford (1911).

I see the MERLIN occasionally in winter, and in the early part of 1915 an individual haunted Theydon Bois for some days. Other dates for the same locality are 28th November 1915 and 19th January 1918.

Some time in the summer of 1910 I saw an undoubted HOBBY near Belhus Park, although I find now that so interesting an experience passed unmentioned in my note-book.

Perhaps here may be inserted the record of a strange bird which flew across the lake at Highams Park to settle in a neighbouring field. My companions at the time were those accomplished observers, Miss G. Lister and Miss Hibbert-Ware, and we were all at a loss to name the creature, which had the flight of a falcon, but a most un-hawk-like voice. After a little trouble we were able to get a better view, finding the bird to be a Rose-ringed Parakeet. It was, in spite of the season (22nd January 1916), in obvious health and strength ; and it may be added that six months later, two miles above Abridge, I was again befooled by the familiar but unrecognised note of the same species, if not the same individual.

Many visits to the bird-haunted coast north of Shoebury produce a few records of BRENT GEESE, never in large numbers ; and once I flushed an individual far from the estuary on the marshes near Vange. In October 1910 a skein of Grey Geese flew overhead near South Weald, and from their noisy calls I wondered if they were White-fronted Geese. On the 22nd April 1918 a skein of fifteen Geese flew over Theydon Bois station, quite low down ; but although a dozen people had a good view of the birds, I did not pick them up until they were right in the eye of the sun, and unrecognisable. I watched them circle around the Sewage Farm marsh, but then too far away for identification. Enquiries of my luckier fellow-passengers did no more than prove that they were “ Grey Geese ” —that is, showing no signs of black, and therefore not Canada Geese. On the 23rd March 1918 Lieut. N. Abbott saw three Grey Geese on the lake at South Weald ; and on the 20th April (two days before the Theydon visit) after a close examination through X12 glasses, he came to

the conclusion that two birds on the water then were GREY LAGS. Even when in the hand the various species of Grey Geese are often difficult to identify ; but, at the same time, the birds seen on these two occasions at South Weald could hardly have been White-Fronted, the likeliest to occur in the district.

Once only have I met with the SHELD-DUCK in Essex, seeing a party of a dozen or so far out on the sands (or is it mud ?) north of Bradwell, in the winter of 1910-11. On the 14th December 1910 I heard the so-called "spring note" of a male PINTAIL at South Weald, and had a good view of the bird—was it a wild one? Three years later, in winter, I saw my second Essex Pintail, also a male, on the lake at Navestock. My other field notes on Essex ducks are too trivial for record ; not only have I nothing new to record for the commoner species, but all except the MALLARD seemed to be scarcer than the nature of the county might suggest. Along the course of the Roding, where floods are frequent in spring, a favourite nesting place of the MALLARD is in the crown of a pollard willow, or in a hollow tree. In former years the POCHARD was a numerous visitor to the pond at Birch Hall, but since 1914 it has decreased annually, for some unknown reason. On the 20th April 1919 there were three SHOVELERS on this pleasant water, and the TUFTED DUCK is not infrequent here.

Once or twice, in the interesting district inland from Purfleet, I have heard the tri-syllabic whistle of the QUAIL. In this locality I saw a nest containing 18 eggs of the GREY PARTRIDGE, with one egg of the RED LEGGED species. In May, 1916, Mr. Gordon Newton found a RED LEGGED PARTRIDGE'S nest 16 feet from the ground, in an ivy-covered tree at Theydon Bois. Near Shonk's Mill a Grey Partridge was sitting on 19 eggs.

I cannot complain of any unfamiliarity with the WATER RAIL in Essex, having had frequent and good opportunities for observing the bird, nearly always in winter, although an empty nest seen in the Roding Valley in 1915 probably belonged to the species. The Rail takes easily to the water, bobbing the head vigorously as it swims. The bars on the flanks are not at all conspicuous, but the white under tail coverts are very showy. Once I saw a Water Rail, far from cover, feeding on the drowned earthworms left on a pasture after a flood. The bird can climb through a bush with the agility of a stoat.

My only record for the SPOTTED CRAKE is the late date of the 19th November 1916 at Birch Hall ; summer is said to be the more usual season. I flushed the bird at close quarters, and it half ran, half flew, into the shelter of the rushes, the short bill and distinctly spotted back making identification easy. This was my first experience of a living Spotted Crake ; and, in 1911, near Shonk's Mill, I saw a small bird which must have been either Baillon's or the Little Crake. The bird took refuge in a bush on the wrong side of the river, and refused to emerge in spite of a prolonged fusillade of the scanty missiles that the local geology afforded. The CORNCRAKE has already been treated at sufficient length in the ESSEX NATURALIST (xviii., p. 189.)⁹

First on the Mardyke, and later in other places in Essex, I was delighted to find the MOORHEN weaving a sort of transparent canopy to its nest, a habit long known to me from the description given by Sir Thomas Browne more than two centuries ago ; but I have not observed the habit in the COOT. I have seen nests of the Coot at Birch Hall and at Navestock ; and, I fancy, elsewhere. On the 14th May a newly-hatched Coot was clothed in black down ; the back of the head was crimson, the space in front ultramarine blue, both areas set sparsely with black bristly hairs. The tip of the bill was black, then a band of white, followed by a patch of bright scarlet meeting the blue of the crown. Between eye and bill was a patch of vivid scarlet warts, fleshy in texture (and, as I find by specimens in the Essex Museum, retaining their tints fairly well after death) ; a patch of chrome yellow down beneath the gape, and around the neck a broad collar of orange down. A young Moorhen examined at the same time had faint traces of blue and crimson on the head, the beak being red, tipped with green, this again tipped by the pale yellow "egg-tooth."

At the lake at Navestock Old Park on the 2nd May 1912 I met with a beautiful adult TURNSTONE, which uttered its trilling lark-like song as it flew over the water.

On the 21st April 1916 we flushed, more than once, a handsome JACK SNIPE on the Sewage Farm at Theydon Bois. This is sufficiently late a date to be worth recording. The COMMON SNIPE breeds here, and in several localities in the Roding Valley.¹⁰

⁹ The Corncrake was again observed at Theydon on the 2nd June, 1919.
¹⁰ Zool. 1912, p. 196, and E.N. xviii., p. 109.

Here I find the birds, in the nesting season, much addicted to perching on bare trees or stumps ; and on the 18th May a bird was actually uttering its " jick-jack " note from the branch of a dead ash tree 30 feet from the ground. Near the same spot I saw a Snipe forcibly knocked from its perch on an iron rail by a smaller bird which was either a Thrush or a hen Blackbird. The nest of the Snipe in this district is always well concealed. Since 1912 the Snipe's curious habit of flying back downwards has been noticed on several occasions in Essex.

Sometimes we notice the purring whistle of migrant DUNLINS over Theydon, and the bird occurs also on the lake at Navestock. A dense flock manœuvring over the Maplin Sands on the 7th January 1910 was, I estimated, three-eighths of a mile long. In May of the same year, near Rainham, we watched a flock of fifteen Dunlins in full summer livery, and I came to the conclusion that these belonged to the larger northern race which I used to see on migration in the northern counties when the resident Dunlins were already settled at their breeding stations.

In 1909, 1910 and 1911 I frequently encountered the GREEN SANDPIPER in Essex, chiefly in autumn, and sometimes in winter. Along the Roding I seldom failed to see it, but latterly this entertaining bird has seemed scarcer. At Theydon on the 30th April 1917 we saw a spring example. During a Zeppelin raid in 1916 we startled a Green Sandpiper from the pond on the Green at Theydon Bois, its piercing whistle (surely the shrillest of bird voices) cutting into the low growl of the other migrant. The same night (either August or September) there was a considerable passage of BAR-TAILED GODWITS, yapping like puppy-dogs as they flew overhead.

The COMMON SANDPIPER in Essex often consorts with the Green Sandpiper, but may be recognised at once by its inveterate bobbing as it walks. On the wing the Green Sandpiper calls to mind a gigantic House Martin, owing to the pattern of dark upper parts and snow-white croup.

The REDSHANK now breeds pretty freely down the Roding Valley, and sometimes at Theydon Bois, where I have often seen the birds in summer. In Essex the nests seem less concealed than they are elsewhere. Like the Snipe, the nesting Redshank is found perching on trees or other elevated objects.

In August one comes across the GREENSHANK along the Thames

estuary, and these birds are so tame that I have been able to see the thickening of the leg-joint indicative of immaturity. The usual call of these youngsters is a tri-syllabic "too, too, too," very loud and emphatic, often heard at night during the autumn migration.

For a week or more in January 1918 a single CURLEW haunted the Sewage Farm at Theydon Bois, and I have come across the bird on rare occasions in other parts of inland Essex; but, strangely enough, I seldom hear this species on migration over Theydon. The rippling whistle of the WHIMBREL is not unusual in May, and of course I have seen this passage-bird in fair numbers on the fields bordering the coast.

On the 4th May 1912 a couple of handsome BLACK TERNS were hawking for (apparently) emerging caddis-flies over the lake at Navestock. The white patch below the tail was very striking against the dark plumage.

GULLS, I think, are, considering the proximity to the sea and to the Thames at London, strangely rare near Theydon Bois, and I do not often see them. The abundance of the GREATER BLACK BACK along the Thames Estuary below Grays struck me as noteworthy in winter.

The LITTLE GREBE nests in some numbers at Birch Hall, where I have sometimes been able to watch the swift movements (a second's work) by which the bird draws a concealing layer of rotten weeds over its eggs before leaving the nest on alarm. The uninformed observer would most certainly fail to recognise the structure then as a bird's nest, and the bird itself is an accomplished hideling. A Little Grebe picked up unhurt in the road outside spent a few hours in my bathroom before I released it. Very often it used alternate strokes of the feet in paddling around the bath, and on alarm its sudden change in draught was remarkable, the body dropping in the water as though it had been pulled down.¹ A piece of board was placed in the bath for a perch; but when we entered the room the Grebe always dived under the wood, holding the top of the head to the nostrils above the surface of the water, and staying in this position as long as we remained in the room.

¹ Zoologist, 1910, p, 201.



Photo by W. L. Hocking.

NEST OF LITTLE GREBE

AS LEFT BY THE BIRD, WITH THE EGGS COVERED WITH WEEDS.



Photo by W. L. Hocking.

NEST OF LITTLE GREBE
WITH WEED-COVERING REMOVED TO SHOW EGGS.

NOTE ON THE RECENT OCCURRENCE OF THE "FAIRY SHRIMP," *CHIROCEPHALUS DIAPHANUS*, AT EPPING.

BY D. J. SCOURFIELD, F.Z.S., F.R.M.S.

[Read 25th January, 1919].

IN Baird's "Natural History of the British Entomostraca," published by the Ray Society in 1850, it is mentioned (p. 54) that *Chirocephalus diaphanus* had been found "near Epping" by E. Doubleday. The date of collection is not given, but it cannot have been later than 1849 (the preface to the "Natural History" is dated December, 1849), and may very well have been several years earlier. So far as I know this old record of seventy years ago has hitherto constituted the sole notice of the occurrence of this beautiful Phyllopod Entomostracan in Essex, notwithstanding the considerable amount of attention which has been given to collecting Entomostraca in the Epping Forest area for many years past.

It was with no little surprise and delight, therefore, that on the 27th July last (1918), whilst searching for larvæ of *Anopheles*, I found specimens of *C. diaphanus* in a small shallow pool on the green, opposite the Bell Inn (known as Bell Common) at Epping. The specimens were not in great abundance and none were fully adult, but nearly all other stages, except, perhaps, the earlier "nauplius" stages, were present. They were associated with *Daphnia pulex* (*obtusa* form), *Cyclops bicuspidatus* and *Cypris* (*Cyprinotus*) *incongruens*, the latter being particularly abundant. There were also various Insect larvæ present.

Thinking that it would be better to let the Fairy Shrimps have a chance of developing a little more, I did not take many specimens, but determined to pay another visit in about a week's time. This was done, but to my astonishment not a single example of *Chirocephalus* could be found after the most exhaustive examination of every part of the pool. In nine days the whole Fairy Shrimp population had entirely disappeared, although when first seen everything pointed to the development of the colony being on the upgrade!

Such an experience is, however, by no means an isolated one. In Norman and Scott's "Crustacea of Devon and Cornwall,"

it is stated that on September 26, 1905, Mr. R. Vallentin collected *Chirocephalus* in a roadside pond, between Gwinear Road Station and Helston, but that a week later not a single specimen was to be found. Dr. A. S. Packard, the well-known American authority on the Phyllopods, has also placed on record a similar case of the rapid disappearance of these creatures.

Now, such experiences, although very disappointing from one point of view, are also exceedingly interesting, and they at once start us asking questions as to the reason for the phenomena. Mr. Vallentin, in the case referred to, imagined that the disappearance might be due to a herd of cattle on their way to Helston market having rushed into the pond and killed all the specimens! Dr. Packard thought that it was a question of temperature and that with the approach of warm weather all the animals died off.

My own opinion is that the sudden disappearance is due to enemies in the pond itself—Ostracods, Insect larvæ, etc.—and this leads to the conclusion that *Chirocephalus* probably cannot maintain itself in an ordinary pond, where it has to compete with the commoner forms of pond-life. This would explain why it is usually recorded from small, non-permanent pools, cart-ruts, etc., just the sort of places, in fact, where competition is presumably at a minimum. It would also explain why *Chirocephalus* appears to be so comparatively rare. It may be supposed that it does actually commence to develop (from eggs carried about by birds and in other ways) in many more ponds than we imagine, but that it is soon disposed of by some of the other inhabitants and in consequence collectors do not chance to find it.

The sudden appearance of *Chirocephalus* in places where it has never before been seen is just as remarkable a fact as the sudden disappearance above alluded to. It is no doubt due to the eggs retaining their vitality for long periods, even after being frozen or embedded in dried mud, and to their distribution over wide areas by birds and other agencies.

There are a good many records now, mostly in the last fifteen years, of the occurrence of *Chirocephalus* in England, but they are mainly from the more southerly counties. The most northerly record that I know of is from near York (specimens in the British Museum). There are no records so far from Wales or Scotland or Ireland.

ON SOME WATER PLANTS.

*Being a Presidential Address delivered to the Club at the Annual Meeting
'on 29th March, 1919.*

By GULIELMA LISTER, F.L.S.

(With 7 Illustrations.)

THOSE of us who are privileged to live on the borders of Epping Forest may find in its ponds and little pools unfailing interest and pleasure. Whether we visit them in winter when the delicate tracery of the hornbeams and birches is mirrored on the still surface of the water and the winter moths flutter down to meet their own reflections, or in summer when the blue dragon flies chase each other about the wealth of herbage that has grown up, whether our interest is in animal or plant life, each pond will be found to have its own character and charm. I propose this afternoon to talk about a few of the water plants that grow in our forest pools and in the Roding, and especially of those flowering plants that develop different forms of leaves, according to the conditions under which they live.

Plants growing in water may have either aerial leaves, floating leaves, or submerged leaves; some plants will have all three kinds of leaves.

Such an one is the Great Water Plantain (*Alisma Plantago*), whose erect oval leaves and large much branched panicles of pale mauve honied flowers are conspicuous in late summer in most of our ponds. The seedlings produced from such plants have a very different appearance from their parents. If we follow the history of the light flat fruits that fall, float, and drift on the surface of the water, we find that they eventually sink to the mud at the bottom, where they pass the winter. In spring the seeds germinate and put forth a tuft of narrow translucent leaves, two to six inches long, which might almost be mistaken for those of a grass. These 'ribbon' leaves are well adapted for a submerged life. Being always bathed in water they have no stout external cuticle, such as leaves growing in the air require to protect them from drying winds; they are supported by the water and so do not need tissues forming either the stiff armour or strong internal props such as are

found in land plants ; the water-conducting woody tissue is much reduced ; the temperature in which the plants live is fairly equable, encouraging free growth, which the abundant supply of carbon dioxide dissolved in the water also favours. In order to take advantage of all possible light filtering down through the water, the epidermal cells often contain chlorophyll, which is never the case with flowering plants on land ; there are no stomata, or none that are functional ; to provide a supply of air and ensure aeration a complete system of air chambers is developed amongst the tissues. The leaves are buoyed up by this means and brought nearer the light. In shape, these ribbon



FIG. 1.

leaves are well adapted for life in slow streams ; they bend with the current, offering little resistance to it, and therefore are not liable to be injured by the flow of water.

But the time comes when the needs of the Water Plantain grow beyond that afforded by the ribbon-leaves ; long-stalked leaves are then produced with small oval blades, which often float on the surface of the water. These floating leaves have a similar structure to those of aerial leaves, except that their stomata are all upon the upper surface. Later still, stronger and completely aerial leaves are formed, with stiff stalks and erect blades six to eight inches long ; and finally the inflorescence is produced. Like most of our water plants the Water Plantain is perennial. In autumn, starch is stored in the stout

milky corm at the base of the stem, and thus a reserve of food is prepared, from which new leaves are supplied the following spring. The ribbon-leaves occur usually on seedlings only, and do not often appear on second year's plants. On the other hand, if the seeds are sown on mud at the edge of the pond, no ribbon-leaves are formed, and aerial leaves with blades at once are produced. Another interesting feature, illustrated by the Water Plantain, which is shared by many water plants, is that its geographical distribution is very wide. It occurs in temperate parts of Europe, Asia and North America, that is all round the northern hemisphere, and also in Australia. The more constant and uniform conditions of water-life appear to account chiefly for these plants having such a vast range.

Another species of *Alisma*, *A. ranunculoides*, used to grow along the margins of our forest ponds, and perhaps does so still. It is also heterophyllous, that is, it has leaves of various forms, the first being usually submerged and grass-like, the later ones aerial, with distinct but narrow blades. The corm, or solid base of the stem, where food is stored, is not so stout as in the Great Water Plantain and from it many long runners grow out, which root and throw up fresh plants.

The third British species of *Alisma* is *A. natans*, the Floating Water Plantain. It is described in our reference books as being very rare in Britain and found sparsely in lakes in Wales, in the north and west of England, in one locality in Scotland, and in a few places in Ireland. Yet it grows in more than one of our Forest ponds ! How it was introduced there we do not know, but it was probably by the agency of a botanist. However that may be, the delicate three-petalled white flowers on slender stalks, rising just above the surface of the water, surrounded by circles of glossy oval floating leaves, are charming objects, and give one a thrill of pleasure as one realises how different they are from the common, but no less beautiful Water-Crowfoot flowers, which grow near them, and which in size and general aspect they resemble. Both the long grass-like and the floating leaves of *Alisma natans* may grow not only from the base of the plant, but from the upper nodes of the slender flexuose stem. In a dry season, when the water is low, plants may be found growing in mud by the margin of a pond bearing only oval short-stalked leaves which are entirely aerial.

Another member of the family *Alismaceæ* bearing leaves of different shapes, is the Arrowhead, *Sagittaria sagittifolia*, a plant common in canals, and slow streams, and abundant in the Roding. The floating leaves are oval, and the aerial leaves arrow-shaped. The submerged leaves are ribbonlike and translucent with blunt rounded ends, and may grow to be a yard long. Where the current is too swift for the arrow-shaped leaves to grow, these submerged ribbons often form great beds swaying in the stream, and may be puzzling to identify unless an arrow leaf is near by to give a clue. With a lens they may be distinguished from other ribbon-leaves by the venation. The

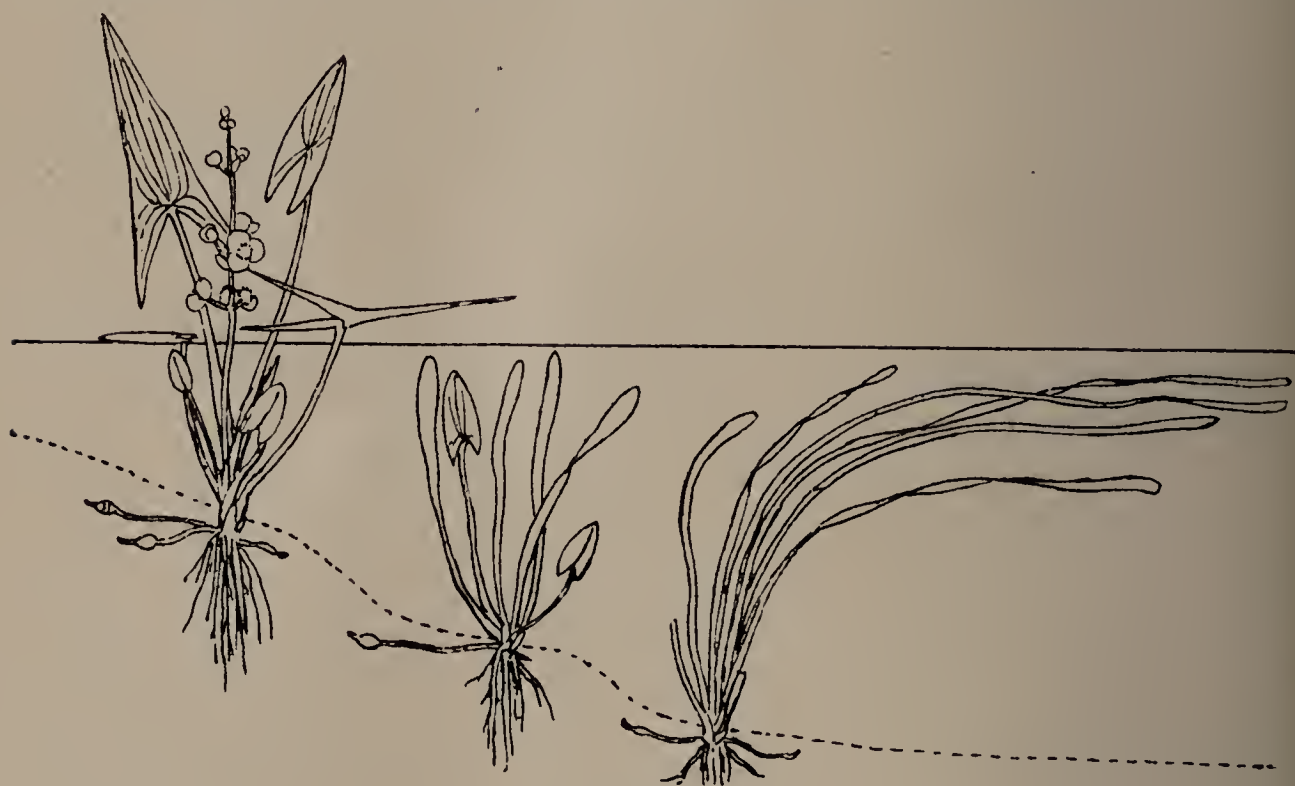
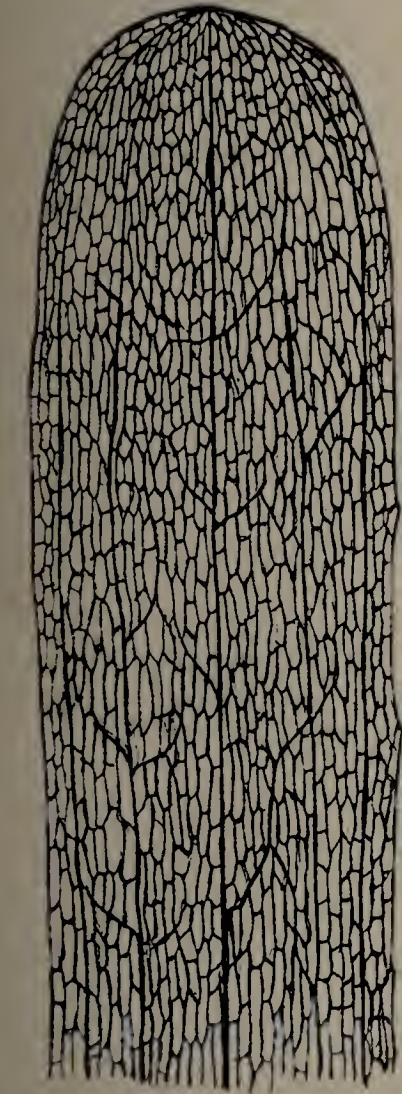


FIG. 2.

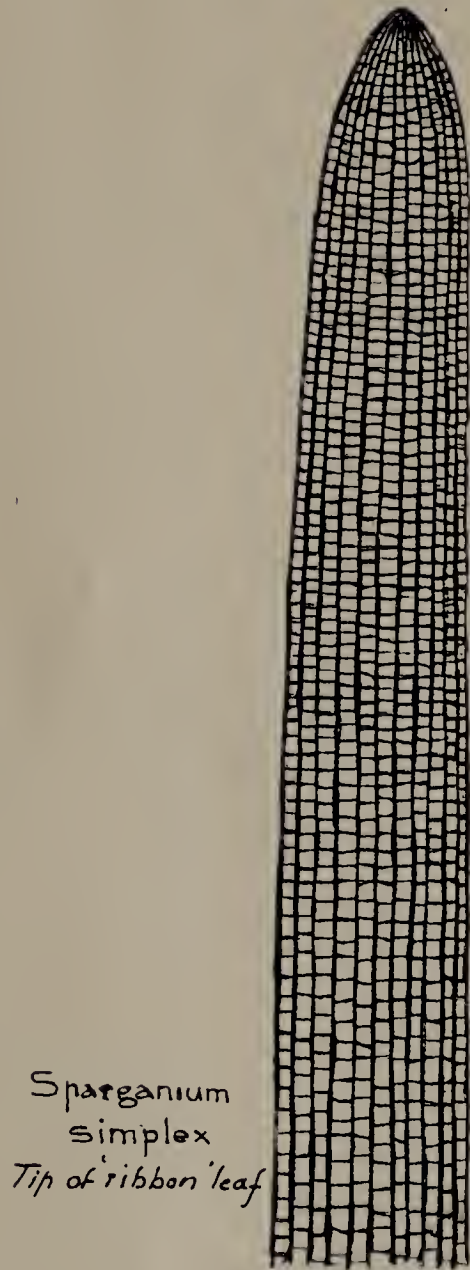
midrib is slightly emphasized and usually there are two parallel lateral veins, from which oblique branches are given off, especially near the tip. One side of the leaf has a tendency to grow more vigorously than the other, the result being that the leaves often have a slight spiral twist. The whorls of large flowers with white, purple-based petals, purple anthers and golden pollen are probably familiar to all of us; the stamens and pistils usually grow on different flowers; the spiky balls of ripe fruit roughly resemble those of Bur-reed. In autumn reserves of food are stored in the corm at the base of the stem and also in tubers borne on long underground runners. These tubers are striking-looking objects; they are round, peacock-blue

in colour, with bands of white spots, and are about the size of marbles. I confess that when I first pulled one up from the mud of a river-bed I thought for a moment I really had found a marble or china bead, through which the runner had grown. Arrowhead is abundant in England from Cumberland southward,



Arrow-head
Tip of ribbon leaf.

FIG. 3.



Sparganium
simplex
Tip of ribbon leaf

FIG. 5.

it is rare in Ireland and only naturalized in Scotland : it is found throughout Europe, North Asia and N. W. India.

The *Butomus* or Flowering Rush, often included in *Alismaceæ*, still flourishes in the Roding and gladdens our eyes with its umbels of pink flowers borne on long stems in mid summer ; the narrow leaves, triangular in section, are all aerial.

Another plant that often has ribbon-leaves is the smaller Bur-reed, *Sparganium simplex*. In the forest ponds, where it

is fairly common, only stiff aerial leaves are formed. Plants living in deep running water produce only ribbon leaves, which may be from two to four feet long. When growing with those of Arrow-head, they can be easily confused with them, but the Bur-reed leaves have a weak midrib, and are traversed by from eleven to thirteen parallel veins, enclosing short rectangular air chambers. Many runners grow out from the base of the stem; some lie along the bottom of the pond or stream, and are green, others, buried in mud, are white. They are stored with starch, and are provided with an abundant system of air chambers which are in communication with the air-space in the leaves. No conspicuous perianth is ever developed in the Reed-mace



FIG. 4.

family, to which *Sparganium* belongs, but the round yellow heads of stamens and the pale balls of pistils are showy objects in summer amongst the shining bright green leaves.

The larger Bur-reed, *Sparganium erectum* L. (or *S. ramosum* Huds.) grows by the lake in Wanstead Park, in the Roding, and in some of the larger forest ponds. It is stouter in all parts than *S. simplex* and the leaves are strongly keeled nearly to the tip. Submerged ribbon-leaves seem to be very rarely formed.

These two species, as well as the graceful *Sparganium natans* L., whose leaves are all either submerged or floating, and which has not, I think, been recorded for Essex, are very widely

distributed, being found throughout the north temperate regions.

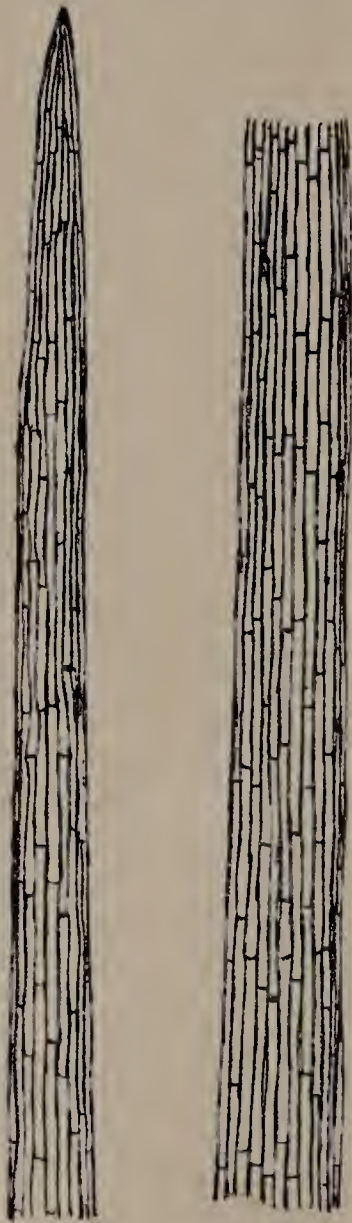
The Great Sedge or Bulrush, *Scirpus lacustris*, when growing in little rivers like the Roding or in the still waters of the Norfolk Broads, sends up from thick creeping rhizomes clumps of long stout cylindrical stems, some of which bear flowers at



FIG. 6.

their summits, while others are flowerless. The leaves form short green or brown sheaths, with little or no development of a free blade, folding round the stem bases; but when growing in deep water in the Thames or Ouse, abundant floating and submerged ribbon-leaves are produced, from two to five feet long, which look like water forests as one passes over them in a boat. They resemble the submerged leaves of Bur-reed,

but may be distinguished under a lens by having many (about eleven) equal and parallel veins running between rows of very long rectangular air-chambers. Both the cortex and central cylinder of the creeping stems are firm and compact in substance, and are traversed with a system of small intercellular air spaces.



*Scirpus
lacustris*
'Ribbon' leaf

FIG. 7.

The cells are richly stored with starch. In Lyte's Herbal (translated from Dodoen's *Cruydeboeck* in 1578) the English names for this sedge are "the pole Rushe, or bull Rushe, or Mat Rushe: in French "*Jonc à cabas*," that is to say, "The frayle Rushe or panier Rushe, because they used to make figge frayles and paniers therewithal." Up to the present day the Great Sedge is still harvested, and bundles of the long dried stems are sent over from Holland to be woven into matting. In Ann Hathaway's cottage near Stratford on Avon, where the old furniture has been reverently kept as it was in Shakespeare's time.

we found that the foundation of a bed on which the mattress would rest, was woven from these stems, and it looked still in good condition. *Scirpus lacustris* is a good instance of how widely water plants

may be distributed; it flourishes in all temperate regions of both the northern and southern hemispheres.

In the Pond-weed family, *Naiadaceae*, the formation of submerged narrow leaves is characteristic of the whole group, and very often these only are produced. An example may be seen in the Grass Wrack, *Zostera marina*, whose long glossy deep-green ribbon-leaves form extensive beds off the Essex coast near Walton and elsewhere. It is one of the very few flowering-plants that has taken to salt-water life. Although it does not grow within the wash of breaking waves, Grass Wrack

is subjected to the flow of under currents, and the strain that it has to withstand must often be great ; indeed, fragments of the leaves and of the brown creeping rhizomes are frequently thrown up as jetsam, after storms, on the neighbouring shores. Examination of the leaves shows that they are strengthened without and within ; the outer walls of the epidermal cells are very thick, far thicker than in any other ribbon-leaves we have been considering, and the delicate green tissues within are traversed by many strands of tough elastic fibres ; similar strands of fibres are scattered also through the cortex of the creeping stem.

The inflorescence of the Grass Wrack is an inconspicuous spike of stamens and pistils arranged on one side of a flattened axis, and enfolded by a membranous spathe, or sheathing leaf-base. Fertilization takes place under water, within the protection of the spathe. The pollen consists of long slender rod-like bodies, very different in appearance from the usual round pollen grains. The dried curled leaves are much used as packing material for glass and china. At Rotterdam I saw barges laden with the crisp dark-brown masses, collected probably from the beds of *Zostera* growing in the Zuyder Zee. The distribution of *Zostera marina* is wide, for it occurs on most temperate coasts.

Along the south coast of France there grows in some places a plant closely allied to *Zostera*, which also has become adapted to marine life ; this is *Posidonia Caulini*. On the shore near Hyères winter storms tear up the leaves and stems, while the waves pile them into high banks or roll the fragments into curious fibrous balls several inches across.

The Floating Pond-weed, *Potamogeton natans*, is abundant in the forest ponds, where the broad blades of the floating leaves may cover the whole surface of the water. The narrow-leaved variety, subspecies *polygonifolius*, is common in the Roding. In winter, and always where the current is swift, no floating leaves appear, but instead are to be found submerged leaves, some with narrow translucent blades on long petioles, others with long bladeless petioles, and others consisting of thin ribbon-leaves.

And here I should like to refer briefly to a theory which throws fresh light on the leaves of these Monocotyledonous plants.

The view that Monocotyledons are derived from Dicotyledonous ancestors is one for whose support a considerable mass of evidence has been obtained. The typical leaves of Monocotyledons, however, with their narrow shape, parallel veins and sheathing bases, are remarkably different from what occur in any large group of Dicotyledons. According to the "Phyllode Theory of the Monocotyledonous Leaf," a paper recently published by Mrs. Arber, all Monocotyledonous leaves are to be interpreted as representing either the leaf-stalk or leaf-base of the Dicotyledonous leaf; and where a blade is developed, this does not correspond to the characteristic leaf-blade of Dicotyledons, but is to be regarded as a new secondary structure formed by the spreading out of the petiole, in response to special requirements. This theory has received strong additional support from anatomical evidence, namely, in the discovery that many Monocotyledons possess "inverted" vascular bundles in their leaves. I will try to explain briefly what this means:—

A vascular bundle contains two kinds of conducting tissues, wood and bast; the wood conducts water, the bast food-stuffs. The cylindrical petioles of Dicotyledons have a complete ring of bundles, in which the wood lies on the inside, the bast on the outside: where the petiole meets the blade the bundle ring opens out, with the result that all the bundles or veins in the blade have the wood on the upper side of the leaf and bast on the lower. In the leaves of many Monocotyledons it has now been found that there occur, besides the normally oriented bundles, a series of small inverted bundles near the upper leaf surface, with the bast directed to the upper side and the wood to the lower. Such an arrangement is readily accounted for if these so-called leaf-blades are regarded as cylindrical petioles, that have become flattened out and extended.

As an example we may take a leaf that seems to have been little changed from a petiolar structure, like that of a Daffodil. This is flat and of nearly equal width throughout; a cross section shows that on the outer side (away from the axis of the plant), is an arc of normal bundles, that is with bast on the outside and wood inside; on the inner side of the leaf (facing the axis of the plant) is a series of small inverted bundles, with a reverse arrangement of wood and bast. It is just as if a ring of bundles had been pressed so that the two sides came close together.

A case where the application of the theory seems more difficult may be seen in such a Monocotyledon as the Frogbit (*Hydrocharis Morsus-ranae*) whose rounded floating leaves are a conspicuous feature in summer on many of our ponds. In general appearance they look much like small Water-lily leaves, but the Water-lily is a Dicotyledon, and has true leaf-blades with normal bundles only forming the veins, while the Frogbit leaves should probably be regarded not as leaf-blades, but as expanded leaf-stalks; for they possess those significant inverted bundles, which seem to show us how the leaves are to be interpreted.

This brief sketch gives but an inadequate idea of the matter; to understand the evidence and full bearing of the subject, I would refer those interested to Mrs. Arber's lucid paper in the *Annals of Botany*.¹

To return to the Frogbit. In the season of early spring the only evidence of its presence in the ponds is to be found in the smooth oval resting buds, which during the winter have been lying in mud at the bottom, and now, quickened by the warmer temperature, are rising to the surface, looking like little erect acorns. Soon the sheathing outer scales fold back and the first small upright leaves appear with minute kidney-shaped blades (as for convenience they must still be called), and the young rootless plants will be seen drifting about over the water like little rosettes. In summer the larger floating leaves and long hanging roots will have formed, and the frail white flowers will appear; then long runners grow out, bearing at their ends the resting buds by which the plant is chiefly propagated.

Water-lilies possess two kinds of leaves, namely, the familiar substantial flat leaves that float on the surface of the water, and also great wavy flaccid submerged leaves that never rise to the surface. On the under side of both kinds are numerous glands secreting mucilage, and this, by making the surface slimy, probably prevents too rapid diffusion of substances in the cell sap into the surrounding water.² In some reference books it is stated that Water-lilies also form long ribbon-leaves when growing in deep water, but after vain search for them I learn from a reliable authority that they appear to be entirely

¹ *Annals of Botany*, vol. xxxii, No. cxxviii., Oct., 1918

² See Willis "*Flowering Plants and Ferns*" ed., 2. p. 162.

mythical. The stout stems from which the leaves and flowers arise creep along the bottom of ponds, rooting on their under surfaces. Naturally they are not often in evidence. In the summer of 1901 the lake in Highams Park, Woodford, was almost dried up, and the fine beds of Water-lilies suffered a severe experience. The leaves withered, and a great carpet of the rugged green interlacing stems was exposed to the air for many weeks; happily the plants in time quite recovered. The glorious flowers of the Water-lilies need not be described here.

There are many other attractive water plants in the forest ponds which claim attention, but I will only refer briefly to three more.

One of the most familiar is the Water Crowfoot, *Ranunculus aquatilis*, whose white blossoms appear in sheets on the surface of the water in summer time. This plant has both floating and submerged leaves; the former are flat, shining and lobed, the latter finely divided into numerous hair-like branchlets. Leaves may be found occasionally combining both forms, one half of the blade being flat and the other divided into narrow segments. Like most of the water plants, it is perennial; in autumn the floating leaves die, while the submerged leaves live on near the bottom of the pond.

The Bladderwort (*Utricularia vulgaris*) is common in many ponds in the forest, and, although often occurring in great abundance, it is inconspicuous from being entirely submerged. Some of the segments of the delicate feathery leaves are modified to form complex bladder-like traps, whose function is to catch and then absorb the remains of minute water-creatures.³ These humble, flaccid, rootless water-weeds produce in summer slender erect racemes of surprising rich-yellow orchid-like flowers, borne well above the surface of the water, for their affinity is with the beautiful purple-flowered Butterwort of our northern bogs. Apart from any seed which may be formed, propagation in the Bladderwort is well provided for by the formation of many winter buds, little balls of closely overlapping leaves, which during the cold season sink down, and rise again in the spring to grow into new plants.

Unsurpassed in charm by any water plant that I have mentioned is the Water Violet (*Hottonia palustris*), a plant abundant in some of the ponds in the south part of the forest. Belonging

³ For a description of the elaborate and sensitive mechanism of the traps, and the way in which it works, see C. L. Withycombe, "Observations on the Bladderwort; Knowledge, vol. xxxix., December, 1916: figs 194, 196, 197.

to the *Primulaceæ*, it is an adventurous member of a family of land plants which has taken to water-life. Its affinities are easily recognized when the flower is examined. The whorls of delicate lilac, yellow-throated flowers closely resemble some of the Chinese Primulas, often grown in greenhouses, such as *P. malacoides*; but the leaves are unlike those of any *Primula*. The blade on either side of the midrib is divided into stiff narrow segments with a pectinate arrangement. Adapted to their surroundings the tissues enclose large air spaces, and on the under surface of the leaf are many short glandular hairs, which probably secrete mucilage. Similar hairs are present on the flower stalk. The succulent stems are fastened below to the mud by slender white roots glistening from the enclosed air spaces. Throughout the year the circles of bright green leaves may be seen under the water, often just beyond the collector's reach; and this is not without its advantage when the plant is in flower, for the sight of a bed of Water Violet in blossom is apt to create in the heart of even the most philosophical botanist a craving to possess at least one piece.

I have put these notes together to illustrate how rich our neighbourhood is in Water plants, and in the endeavour to show how much the interest in these plants is enhanced if their structure is studied in relation to their surroundings.

In conclusion I wish to thank Mr. Dennis for the trouble he has taken in making lantern slides from my drawings, and also for the generous loan of his own beautiful slides showing water plants growing in their natural haunts.

DESCRIPTION OF TEXT FIGURES.

- FIG. 1.—Diagrammatic section of a pond with Water Plantain (*Alisma Plantago*), showing seedlings in deeper water with ribbon-leaves only, and in shallow water with aerial leaves; also a full-grown flowering plant with submerged, floating and aerial leaves.
- FIG. 2.—Arrowhead (*Sagittaria sagittifolia*). Plants in deep water with ribbon-leaves only, and one in shallow water with leaves mostly aerial and sagittate. Tubers occur on underground shoots.
- FIG. 3.—Free end of a ribbon-leaf of Arrowhead, showing venation.
- FIG. 4.—Small Bur-reed (*Sparganium simplex*), showing deep and shallow water plants connected by runners; the stream bed is seen in section.
- FIG. 5.—Free end of ribbon-leaf of *S. simplex*, showing venation.
- FIG. 6.—Great Sedge (*Scirpus lacustris*), showing plants in deep water with ribbon-leaves only; in shallower water with ribbon-leaves and flowerless scapes; and in very shallow water without ribbon-leaves and with both flowerless and flowering scapes; river bed seen in section.
- FIG. 7.—Free end of ribbon-leaf of Great Sedge, showing venation.

MUSEUM NOTE NO. VIII.—COLLECTIONS OF BRITISH RUBI

A COLLECTION of British Rubi Fruticosi, comprising over 300 herbarium sheets, has recently been arranged and collated. In addition to these, the Museum possesses a number of duplicates and also of specimens unnamed or undeterminable by the Rev. W. Moyle Rogers.

The greater part of the collection was contained in the Powell Herbarium, acquired by the Museum in 1904. Mr. J. T. Powell (1833—1904) was a well-known collector of Rubi, and as very many of his specimens have been examined and commented upon by the Rev. W. Moyle Rogers, Prof. Babington and Dr. Focke, they are particularly valuable to students of British Brambles. Powell corresponded with many well-known botanists and his collection is rich in specimens obtained through the Watson Botanical Exchange Club.

The Essex Rubi are well represented, and a special collection of Epping Forest Rubi, illustrating Powell's papers in the *Essex Naturalist*¹ are preserved separately from the general series, though the latter contains duplicate specimens from Epping Forest.

Some of the specimens are of interest as being either actual type-specimens, or duplicates collected in the same locality, about the same time, and verified by a well-known authority.

R. rosaceus Wh. and N., subsp. *Powellii* Rogers.

This Epping Forest bramble was first recorded in 1892,² as a variety of *R. hystrix* Weihe, but in 1894 Moyle Rogers described it in the "Journal of Botany"³ as a new species under the name of *R. Powellii*. In Rogers' Conspectus of Rubi Fruticosi appended to Babington's "Manual" (1904) it ranks as a subspecies, as shown above. A specimen of this subspecies in the Herbarium bears the following note in Powell's handwriting, "New variety, Named and described by the Rev. W. Moyle Rogers." The specimen is from High Beach, Aug. 1893, and may be regarded as a type-specimen.

R. pallidus Wh. and N., var. nov. *leptopetalus*.

A specimen in the Herbarium is marked "*Rubus pallidus* W. and N. v. *Lochri prius* ..(*leptopetalus* var. nov. 'Handbook,' p. 75). Thicket in Epping Forest, near Buckhurst Hill, S. Essex, 20. ix. 1888. Named by Rev. W. Moyle Rogers. See ESSEX NATURALIST XI. (1900), p. 267."

Of non-Essex specimens, the following are of interest:

R. Lintoni Focke. The specimen was collected by E. F. Linton, at

¹ *Essex Naturalist* iii. (1889), 20; v. (1891), 189; vi. (1892), 80; and "Two More Epping Forest Rubi" xi. (1900), 257.

² *Essex Naturalist*, vi. (1892), 80. ³ *J. of Botany*, 1894, p. 47.

Sprowston, Norfolk, in 1885, and was described by him in the "Journ. of Botany," 1887, p. 82, as *R. lucens*, but this name being already in use, Dr. Focke renamed it after Linton ⁴. Writing in 1893⁵ Rogers says, "A small, well marked plant; still, I believe, only recorded from the Rev. E. F. Linton's two Sprowston localities, Norf."

Two Irish specimens are of interest:

R. myricae Focke, v. *hesperius* Rogers.

This form was regarded by Rogers as a species or variety and was described by him in 1896⁶. He says, "This is the bramble referred to by Messrs. Marshall and Schoolbred, its discoverers . . . a striking plant found at Oughterard, Maam, Clonbur and Cong."

The specimens in the Herbarium bear the label of E. S. Marshall and were collected at Clonbur, W. Galway, 12. vi. 1896. The label is marked "(confirmed by R.)" and bears the stamp of the Watson Botanical Exchange Club.

R. Drejeri G. Jensen., subsp. *hibernicus*, Rogers.

The type was described by Rogers ⁷, and was received from "Revs. C. H. Waddell and H. W. Lett from Saintfield and Aghaderg, Co., Down. Collected 1894-5."

A specimen sheet in the Herbarium bears the inscription, "thicket, Saintfield, Co. Down, 3 Aug. 1895 (fide W. M. Rogers.)," and is stamped Watson Botanical Exchange Club.

A specimen in the Herbarium with a label in the handwriting of Powell bears the inscription, "*R. Koehleri* v. *pallidus*? Bab. Woolpit Warren (open ground) W. Suffolk, 5 Aug. 98." To this is added a note in Rogers' caligraphy. "Yes, I think, certainly *pallidus*, Bab. which I am THINKING of describing afresh and calling *R. dasyphyllus* some day soon. W. M. R." The idea was apparently carried out, for in the Appendix to Babington's "Manual" the form is named *R. Koehleri* Wh. subsp. *dasyphyllus*, Rogers.

Another series of 28 sheets of Essex Rubi was presented to the Museum by Mr. C. E. Britton, in illustration of his paper, entitled "South Essex Brambles."⁸ These are incorporated with the general collection of Rubi.

The matter of classification and nomenclature raised considerable difficulties in arranging the collection, but after careful consideration it was decided to adopt that given by the Rev. Moyle Rogers in his "Handbook of British Rubi," and inserted as an appendix in Babington's "Manual of British Botany," 9th Ed., 1904. Out of 176 species and varieties given in this list, 118 are represented in the Museum Herbarium, and it is hoped that students of this difficult group will avail themselves of the well authenticated specimens in the collection.

HENRY WHITEHEAD, B.Sc.

⁴ J. of Botany, 1887, p. 331.

⁵ W. Moyle Rogers, "An Essay at a Key to British Rubi," J. of Botany, 1892-3.

⁶ J. of Botany, 1896, p. 504.

⁷ J. of Botany, 1897, p. 48.

⁸ Essex Naturalist, xiii. (1904), 191.

ESSEX FIELD CLUB — REPORTS OF MEETINGS.

VISIT TO THE ROYAL GARDENS, KEW

(502nd MEETING).

SATURDAY, 3RD MAY 1919.

An enjoyable and instructive visit to the Royal Gardens, Kew, for the principal purpose of studying the Trees and Shrubs, under the expert guidance of Mr. A. Bruce Jackson, was made by, in all, some 40 or more Members, though, unfortunately, some of the late-comers failed to get into touch with the main party until late in the afternoon, and consequently missed much of Mr. Bruce Jackson's valuable exposition.

The party assembled at the Victoria Gate entrance at 2 o'clock, and was introduced to the Conductor by the Hon. Secretary; whereupon Mr. Bruce Jackson assumed charge and led off the party on a detailed tour of the Arboretum and Pinetum; several of the Houses were also visited, and, later on, the rock garden.

Tea was taken at the Pavilion in the Gardens at 5 o'clock.

After tea, a formal Meeting of the Club was held, with Miss E. Willmott, F.L.S., V.M.H. in the Chair, when Mr. Harold E. C. Powers, of 4, *Grove Crescent, Woodford*, and Mr. Henry Spence, B.Sc., of 29, *Fairland Road, Stratford*, were elected Members of the Club, and two candidates were nominated for election.

The party then dispersed.

RAMBLE IN THE WEST TILBURY DISTRICT

(503rd MEETING).

SATURDAY, 24TH MAY 1919.

A party of nearly 30 Members and friends met at Tilbury station at 11.2 o'clock, or "joined up" later at West Tilbury, under the conductorship of Messrs. Miller Christy and Percy Thompson, for the purpose of visiting the site of Queen Elizabeth's "Camp Royal" and incidentally of studying the natural history and archæology of the district.

On leaving Tilbury station, opportunity was taken to inspect the site of Daniel Defoe's unfortunate business venture as a tile-maker, which lies on the foreshore, immediately beneath the bridges which connect the railway station with the steamboat pier. Defoe was for many years secretary to a pan-tile business here, but the tiles turned out were of inferior quality, being made of the alluvial mud from the river, and, in competition with the Dutch tile-makers, the concern became a failure, Defoe himself losing £3,000. Mr. Percy Thompson read a letter written by Defoe to Lord Treasurer Harley, (see "*Essex Review*," xi. p. 119) in May, 1704, in which he gives an account of his hopes and final disappointment in connection with this unfortunate venture.

A short walk along the river-wall, where *Chærophylum anthriscus* was noted, also a deeply pink-flowered bush of *Cratægus oxyacantha* growing by the side of a marsh-ditch, brought the party to Tilbury Fort, the

ornate Renaissance gateway-entrance of which was viewed with appreciative interest by the visitors. The inscription on the facade runs :—

CAROLUS II REX.

A. REG. XXXIV.

which is equivalent to the date 1683 : actually the Fort was being built between the years 1682 to 1687.

Crossing the two-mile breadth of marshland between the Fort and the line of low hills, running east and west, which rises steeply from the alluvial flat and marks the northern limit of the modern Thames valley, botanizing was indulged in, and several interesting plants observed : among these may be noted *Lepidium draba*, *Trifolium subterraneum*, *Vicia hirsuta*, *Medicago maculata*, and *Alopecurus fulvus*.

Arrived at West Tilbury, lunch was disposed of, and the "Rector's Well," in an arable field on the slope of the hill, was inspected. This well, as was fully explained to the party by Mr. Miller Christy, is one of two one-time famous mineral springs in the parish of West Tilbury,¹ sunk in the Thanet Sands to an unknown depth, the water of which, whether of medicinal value or not, is still used by neighbouring residents. The other well, believed to be the *original* one of the two, is beneath the floor of the kitchen of West Tilbury Hall, and its water is pumped for domestic use by a wooden, lead-spouted pump in the kitchen ; the visitors were glad to quench their thirst at this classic source and found the water perfectly tasteless and most refreshing. It was mentioned that one of the original bottles in which, in the 18th century, this water was sent out to patrons, is still preserved at the Rectory, but time did not permit of its being seen.

West Tilbury Church with its square tower crowns the ridge of hills, and was next visited, but presents little of antiquarian interest, it having been largely rebuilt in modern times, but a broken stone coffin-slab with a raised cross-pommelée is preserved in the interior, and a small fragment of faded mural painting exists in a recess in the south wall of the chancel.

The hill upon which the church stands is composed of Thanet Sand, capped with Pleistocene gravel, and commands most extensive views in all directions over the river marshes and across the Thames to the corresponding heights of the Kentish bank. In and about the churchyard, several interesting plants were noted, including *Saxifraga granulata*, *Salvia verbenaca*, *Hyoscyamus niger*, and, again, *Trifolium subterraneum*, while fine masses of the fungus, *Polyporus squamosus*, were growing on dead and fallen tree-trunks on the slope of the hill.

Seated on the hill-crest, bathed in the warm sunlight of an ideal spring day (although, unfortunately, a heat haze veiled the distant views), with skylarks singing overhead, the party listened happily enough to an interesting discourse by our Conductor, Mr. Miller Christy, who gave an exhaustive account of the history of the "Camp Royal," which was established in 1588 on this commanding eminence, and for some two miles northwards, to oppose a landing from the Spanish Armada, or an attempt to raid London at the same time, a boom of chains and other impediments being constructed across the river two miles to the south, from Tilbury

¹For a full account of the West Tilbury springs, see Christy and Thresh's "Mineral Waters of Essex," 1910. pp. 34-43. (Special Memoir of the Club.)

to Gravesend, to bar the river-passage. Here it was that Queen Elizabeth visited her troops in person, and harangued them: here, too, it was that the first tidings came of the dispersal of the great Armada by the mosquito-like attacks of the tiny English vessels.

A line of entrenchment, believed to mark an ancient camp of much earlier date than that of Elizabeth, may be seen running along to the south of the Church and Hall, just below the crest of the hill.

A walk of $1\frac{1}{2}$ mile brought the party to Chadwell St. Mary, whose ancient Church of Norman date was next visited, and was found to possess many points of interest the north door with its Norman tympanum and arch enriched with the "sunk-star ornament," the remains of the original Norman clerestory windows, the curious trefoil-headed external niche at the side of the W. door, the rood-stair (now debased to serve the exit of an iron smoke-pipe!), and some excellent Jacobæan wood panelling to a window seat in the chancel, were in turn inspected and admired.

Two Sarsen stones in the churchyard, one of them with typically mamillated surface, and both probably derived from the Thanet Sand, were viewed with interest.

As the afternoon was rapidly passing, it was decided to walk back to Tilbury, across the marshland, instead of continuing along the ridge to Low Street station as originally proposed. Several yellow wagtails were seen on the way, and *Hottonia palustris* and an uncommon variety of moss (*Hypnum riparium*, var. *longifolium*) were gathered in a marsh-ditch.

Tilbury station was regained at about 5.15 o'clock, and tea was expeditiously served to the weary ramblers in the Tea Room adjoining the Booking Hall.

After tea a formal Meeting of the Club was held, with Miss E. Willmott, F.L.S., V.M.H., in the Chair, when Mr. Henry F. Ball, of 30, *Upton Avenue, Forest Gate*, and Mr. Alfred J. Heasman, of "*Erlsmere*," *Pembury Road, Westcliff-on-Sea*, were elected members, and one nomination was read.

Train was taken at 6.20 o'clock for London.

BOTANICAL RAMBLE FROM CHINGFORD TO ENFIELD (504th MEETING).

SATURDAY, 5TH JULY 1919

In spite of a threatening weather-outlook, following a night of heavy rain, 21 Members presented themselves for this expedition, which involved a cross-country walk of $8\frac{1}{2}$ miles, chiefly through grass: happily, 9 a.m. brought a promise of better things, and, with the exception of a heavy downpour in the late afternoon, when the Party were luckily in shelter, the day continued fair and dry.

Assembling at Chingford railway station shortly before 11 o'clock, the visitors walked briskly through the town and down the hill to the King George Reservoir of the Metropolitan Water Board in the Lea Valley, where they were met by our Member and Conductor, Mr. J. Mackworth Wood, M.I.C.E., who is Chief Engineer to the Board (Northern Section).

Entering the Reservoir enclosure, the party was shown the outlet

valves which drain the reservoir when necessary, and which are capable of passing no less than 35,000,000 gallons of water in 24 hours, when all the valves are open.

Mr. Wood here read an interesting account of the fauna of this and the older reservoirs in the Lea Valley, which is printed in full on Page 69.

The entire length (some 2 miles) of the Reservoir embankment was then followed, a profusion of wild plants being noted on the earth-slopes, and characteristic aquatic plants, such as *Sparganium ramosum*, *Alisma plantago*, *Scirpus*, *Sagittaria*, etc., being observed in the "diversion-stream" which runs alongside the reservoir at the foot of the embankment, specimens of which were gathered for further study. Many Sand Martins were hawking over the stream, and speculation was aroused as to where they secured nesting facilities, it being suggested as not improbable that they utilised the drainage-holes left in the stone embankments of the stream, in default of other accommodation. A Whinchat was sighted, and a Great Crested Grebe, but the day, and the necessarily rapid progress of the party, were unfavourable to bird observation, and Mr. Wood's alluring list of the bird-frequenters of the Reservoir had perforce to be taken on trust.

On reaching the northern end of the Reservoir, the Pumping Station at Enfield Lock was inspected, with its 5 great Humphrey Pumps, four of these being capable each of pumping 40,000,000 gallons of water into the Reservoir, and the fifth 20,000,000 gallons, a total of 180,000,000 gallons in 24 hours! By favour of Mr. Wood, one of the larger pumps was set in action for the benefit of the party, and the enormous volume of greenish water welling up from the trunk pipe at each stroke of the pump was a most impressive sight. Mr. Whinnerah, the Resident Engineer, explained the mechanism of the pumps to interested members of the party. Mr. Wood kindly supplies the following account of these mighty engines.

The total area of the Metropolitan Water Board's storage Reservoirs in the Lee Valley, between Walthamstow and Enfield Lock, is about 905 acres and their capacity some 5,541,000,000 gallons. The latest and largest Reservoir (the "King George") has an area of about 425 acres and contains 3,073,000,000 gallons, its circuit being about $4\frac{1}{2}$ miles.

The King George Reservoir is filled from the River Lee just below Enfield Lock. The pumping plant consists of 5 Humphrey Gas Pumps, with a total of 1,350 horse power.

As now installed, the pumps work on the four-stroke cycle as follows. Starting with the working stroke, there is the ignition of a combustible charge compressed into the top of the pump cylinder. This charge is expanded down to a little below atmospheric pressure, which results in a charge of water and a charge of scavenging air being drawn in through automatic valves. At the same time water is delivered through the discharge main to the high level reservoir. This working stroke is followed by a return stroke of the water column, which first expels the products of combustion through the exhaust-valves. These valves are then closed by the impact of the moving water and the air entrapped is compressed into the head of the cylinder, where it forms an elastic cushion, which gradually brings the moving column of water to rest. The re-

expansion of this cushion produces a second out-stroke of the water. The pressure above the latter again falls below that of the atmosphere, with the result that a charge of combustible mixture is drawn through automatic inlet valves. When the forward momentum of the water is exhausted, a second return stroke takes place, which compresses the charge in the cylinder ready for another working stroke. The whole of the valves are automatic, but are interlocked, so that they can only open in due sequence.

We are indebted to one of the Engineering journals for the above technical description.

From the Pumping Station, an uninteresting walk of $1\frac{1}{2}$ mile across the valley westward into Middlesex brought the visitors to the New River at Turkey Street, Enfield, the course of which was followed westward to the head of the aqueduct at Maiden's Brook, and thence along an old disused "loop" which runs through private grounds for several miles. This disused loop formed part of the original New River as constructed by Sir Hugh Myddelton in 1609-1613.

At Myddelton House, the residence of our Member, Mr. E. Augustus Bowles, M.A., F.L.S., F.E.S., through whose gardens and meadows the stream passes, the party was met and welcomed by Mr. Bowles, who kindly acted as conductor, showing the visitors his beautiful gardens and their horticultural treasures. An interesting feature of the gardens is the old stone Enfield market-cross, originally set up in the town market-place *circa* 1826, which, being superseded by a more recent structure, has been re-erected in Mr. Bowles' gardens.

It is impossible here to attempt to enumerate the floral treasures of these famous gardens, which Mr. Bowles exhibited with loving pride: an interesting, and not unsuccessful, attempt to reproduce the floral display of an alpine meadow, by indiscriminate sowing of showy plants in the meadow-grass, is noteworthy, while the adjoining portion of the disused New River (known as the Enfield Loop, which was cut off over a century ago), was seen to be covered with a most luxuriant growth of *Azolla filiculoides* and its banks lined with *Gunnera* and other exotic plants intermixed with the native plants, owing to Mr. Bowles' enthusiastic desire to "make the wilderness blossom like the rose."

Upon taking leave of our host, the hearty thanks of the party were accorded to Mr. Bowles for his kindly assistance and welcome.

The course of the disused New River was still followed westward, until at Flash Lane the visitors reached Wildwoods, where the owner, Mrs. Cowan, had very kindly offered to entertain the party to afternoon tea, which refreshment was indeed most welcome after the long and tiring tramp. On the proposition of the Hon. Secretary, a most grateful vote of thanks was passed to Mrs. Cowan for her hospitality to tired wayfarers.

After tea, a circuit of the finely wooded Lake of some 8 acres in the picturesque grounds was made under Mrs. Cowan's guidance, after which, taking leave of our kind hostess, the walk (another $1\frac{1}{2}$ mile!) to Crews Hill station on the Great Northern Railway was entered upon, and the 7.4 o'clock train for London duly caught.

VISIT TO PURFLEET AND AVELEY (505th MEETING).

SATURDAY, 19TH JULY 1919.

The Club celebrated this day, appointed to be the national Peace Festival, by visiting a "home of ancient peace," set in the peaceful scenery of the Essex country side, Sir Thomas and Lady Barrett-Lennard having kindly invited the Club to visit them at Belhus. Some fears had been evinced that the National Holiday would seriously interfere with the train service and the comfort of travellers, but these were groundless, and "all went merry as a marriage bell," the trains running as usual, and there being no overcrowding.

The party travelled by Midland Railway from Fenchurch or from-Barking to Purfleet, and detrained there at about 12.30 o'clock.

The old overgrown Chalk quarries adjoining Purfleet station, with their tall vertical cliffs, overlain by Thanet Sand and capped by a thin layer of Pleistocene Gravel, presented a most picturesque aspect, and regret was felt that these quarries, known locally as "Botany," are no longer open to visitors, they being in War Office possession, and forbidden to the public under pain of arrest.

The party proceeded by lanes in the direction of Aveley, botanizing *en route* although no out-of-the-way plants were secured, the effect of the underlying chalk upon the local flora was evidenced by the occurrence of such plants as *Clematis vitalba*, *Scabiosa arvensis*, *Artemisia*, and abundant Poppies; while in the Mardyke, a small tributary which empties itself into the Thames just above Purfleet, *Butomus umbellatus* was seen growing in profusion.

Lunch was enjoyed *al fresco*, whilst the party camped out on a partially-demolished strawstack in a cornfield.

At Aveley, which was reached soon after 2 o'clock, the ancient Church, dedicated to St. Michael, was visited, and carefully inspected within and without; a number of manuscript notes, and a series of photographs, prepared and kindly lent for the occasion by a local resident, Mr. Aubrey Goodes, were exhibited by the Hon. Secretary, and greatly aided the visitors to obtain a connected idea of the history of the sacred edifice and of its contents. Much interest was displayed in the account of the theft and recovery of the palimpsest brass to Edward Barrett, now securely fastened in its original matrix in the Chancel floor.

Upon leaving the Church, the party was met by Sir Thomas Barrett-Lennard and was conducted by him through his Park to Belhus, where the visitors were welcomed by Lady Barrett-Lennard at 4 o'clock.

Afternoon tea was very soon served, and before entering upon a detailed inspection of the historic house under Sir Thomas' personal guidance, a short formal Meeting of the Club was held in the Dining Room, by permission of our host and hostess, with Mr. W. Whitaker, B.A., F.R.S., in the Chair (in the unavoidable absence of our President), when Miss Alice M. Crow, of 9, *Dover Road, Manor Park, E.12*, was elected a Member and a candidate was nominated for election at the next Meeting. The Chairman referred to the announcement in the public press of the grant of a Civil List Pension of £50 to Mr. William Cole, and the Hon. Secretary briefly reported on the allowance of a further £75 per annum made by the

Cole Pension Committee out of the fund raised by the voluntary subscriptions of Members and friends.

Formal, but no less hearty, votes of thanks were passed to Sir Thomas and Lady Barrett-Lennard for their kind hospitality.

The party was then conducted by our kind host and hostess through the mansion, with its wealth of old Jacobæan and other furniture, and its remarkable collection of family portraits, which forms an almost perfect series from the time of Elizabeth up to the present baronet. Sir Thomas proved an ideal host, and was full of interesting anecdote touching the qualities, both good and bad, of his predecessors: he kindly contributes the following account:—

Belhus takes its name from the family of “de Belhouse,” who once owned that Manor. The house now existing was built by John Barrett on the site of an earlier one. John died in 1526, and in his will speaks of “my place called Belhouse Hall, alias Barretts, which I have newly builded.”

The last Barrett to own Belhus was Edward, who was Chancellor of the Exchequer, and also of the Duchy of Lancaster, and who was created Baron Newburgh. He died in 1644, and, having no surviving children, left Belhus to his kinsman, Richard Lennard, a son of Richard Lennard, Lord Dacre, on condition that he assumed the name and arms of Barrett. This Richard’s grandson, also christened Richard, married his cousin, Lady Anne Lennard, younger daughter of Thomas Lennard, Lord Dacre and Earl of Sussex, and a grand-daughter of Charles II and the Duchess of Cleveland.

The Lennards since 1612 had been Lords Dacre, owing to the marriage of Samson Lennard to Margaret Fynes, who, upon the death of her brother Gregory, Lord Dacre, became entitled to that Barony in her own right. The Richard who married Lady Anne died not long after, from an attack of small-pox, leaving her enceinte with a posthumous son, who was christened Thomas after his grandfather, the Earl. When the Earl died, his title of Sussex became extinct, as he had no sons who lived to grow up. The Barony of Dacre being one that went in the female line, remained in abeyance between his daughters, Lady Barbara and Lady Anne. In course of time, the former having died without issue, Lady Anne became Baroness Dacre in her own right. She died in 1755, and thereupon her son Thomas succeeded to her title, and then it was that he changed his name from “Barrett” to “Barrett-Lennard.”

Thomas, Lord Dacre, had only one legitimate child, who died in 1749, aged about 9 years. He died in 1786, and was succeeded in the estates by his illegitimate son, Thomas, who had been adopted by Lady Dacre, and who in accordance with the terms of his father’s will assumed the names of Barrett-Lennard. Thomas took an active part in public life, and when England was in danger of invasion from Napoleon, raised a troop of horse, known as the Barstaple and Chafford Yeomanry. The troop was so efficient that in 1801 Thomas was created a Baronet for his services. Sir Thomas’s eldest son, Thomas, was for many years M.P. for Maldon, but he never succeeded his father, dying the year before the latter. Sir Thomas, who lived to be nearly 96, died in 1857, and was

succeeded by his grandson, Thomas, as 2nd Baronet, who died in January, 1919, in his 93rd year.

Thomas, Lord Dacre, greatly altered Belhus, which was in a very bad state of repair when he succeeded to it: he laid out the grounds and formed a considerable piece of water, under the advice of "Capability" Brown. He also formed a fine Library, and got together from members of the family a remarkable series of family portraits, most of which are still at Belhus. They represent all the heads of the Lennard family since Elizabethan times until to-day, and if none of them are by such popular artists as Gainsborough, Romney or Raeburn, they are nevertheless a fine collection, covering as they do a period of over 300 years.

Practically no part of the historic house was withheld from the curious inspection of the visitors, who pryed into the very attics, and the final touch to a most charming visit was afforded by an ascent of the Tower, from the roof of which a fine prospect over the well-timbered Park, and beyond over the Thames valley to the heights of North Kent, was enjoyed.

Taking leave of Lady Barrett-Lennard at about 6 o'clock, the visitors were conducted by Sir Thomas through the Park and kitchen garden and Oak Wood to Little Belhus farm, where Sir Thomas left us, accompanied by the renewed thanks of the party.

By favour of the owner, Mr. Manning, the oak-panelled Drawing Room and delightful enclosed garden of Little Belhus were inspected by the Party, which then hurried by field paths to Ockendon Station, where the 7.12 o'clock train to London (via Upminster) was duly caught, and an end brought to a most enjoyable excursion.

ANNUAL FUNGUS FORAY (506th MEETING).

SATURDAY, 18TH OCTOBER 1919.

The Annual Fungus Foray was held in Epping Forest on the above date, in ideal weather, the Forest being resplendent with autumnal tints—a quite exceptional display, due to the long-continued fine, dry weather and the absence of wind. Members and friends in considerable numbers availed themselves of the opportunity to view the feast of colour which the woodlands offered, and some 100 persons joined the Foray, of whom no less than 57 were of the Morning, or chief working, Party. As on former occasions, some Members of the Gilbert White Fellowship, of the Toynbee Nat. Hist. Society, and of the School Nature Study Union, were present by invitation of the Club.

Unfortunately, the weather, which was so grateful to human kind, was by no means favourable to the growth of damp-loving fungi, and the woods, usually gay with toadstools of varying hues, were on this occasion almost bare of such. However, the paucity in numbers of the larger, more conspicuous Agarics led to more careful search for smaller specimens, and, as a result, some of the less-conspicuous ascomycetes and bark-fungi, which tend in normal seasons to be overlooked in the widespread display of their more conspicuous brethren, were sought out, so that the gatherings, as eventually laid out on the tables at the Headquarters, made by no means a poor display, and included some interesting forms.

Hydnum coralloides was again found in its former station at Fairmead.

The Morning Party started from Theydon Bois station at 11.3 o'clock and proceeded across the Green and along the Loughton Lane to Gaunt Wood, which was traversed by kind invitation of our Member, Mr. Gerald Buxton, J.P., as were also the grounds of Birch Hall, the Forest being entered at a point between Theydon and Debden Green. From here, after an *al fresco* lunch, the route taken was via Broadstrod, Great Monk Wood, and the Wake Valley, to the headquarters, the Roserville Retreat at Highbeach.

The afternoon Party assembled at Loughton Station at 2.34 o'clock, and made its shorter way via Staples Pond, Debden Slade, and the "Robin Hood," to Highbeach.

The specimens brought in by the collectors were named by the referees, who were :—

	Miss A. Lorrain Smith, F.L.S.
For the Basidiomycetes and	Miss E. M. Wakefield, F.L.S.
Ascomycetes	Captain J. Ramsbottom, F.L.S.
	Mr. Arthur A. Pearson, F.L.S.
For the Myxomycetes	Miss G. Lister, F.L.S.

Tea was taken at 5 o'clock, after which a short formal Meeting (the 506th) of the Club was held, the President in the Chair.

Mr. Gilbert W. Morrison, of "Starling Lodge," Buckhurst Hill, was elected a Member, and nominations of three candidates for membership were read out.

Brief reports on the specimens found during the day were made by each of the Referees in turn, and the thanks of the Meeting were accorded to them for their services: the party then made its way along the dark Forest roads to Loughton and Chingford stations, homeward bound, after a very pleasant and not unprofitable day.

Mr. A. A. Pearson, F.L.S., contributes the following list of the fungi found :—

Amanita phalloides, mappa, muscaria, rubescens.

Amanitopsis vaginata.

Lepiota amianthina.

Armillaria mellea, mucida.

Tricholoma fulvum, terreum.

Clitocybe aurantiaca, brumalis, ditopus.

Laccaria laccata & var. *amianthina.*

Collybia platyphylla, maculata, butyracea, tuberosa, dryophila.

Mycena galericulata, polygramma, inclinata, ammoniaca, metata, sanguinolenta, galopus, epipterygia, pelliculosa.

Omphalia fibula var. *Schwartzii.*

Pleurotus ostreatus.

Hygrophorus laetus.

Lactarius turpis, blennius, quietus, glyciosmus, mitissimus, subdulcis.

Russula lepida, emetica, ochroleuca, fragilis, lutea.

Cantharellus tubæformis.

Marasmius peronatus, androsaceus.

Panus stypticus.
Lenzites betulina.
Pluteus cervinus, nanus.
Nolanea pascua.
Hebeloma fastibile, crustuliniforme.
Galera tenera, hypnorum.
Cortinarius (Dermocybe) cinnamomeus.
 ,, (Telemonia) *armillatus, hinnuleus.*
 ,, (Myxacium) *elator.*
Paxillus involutus.
Psalliota campestris.
Stropharia aeruginosa, squamosa, semi-globata.
Hypholoma fasciculare, hydrophilum.
Psilocybe uda, semilanceata.
Psathyra fibrillosa.
Coprinus atramentarius.
Psathyrella atomata, disseminata.
Boletus badius, chrysenteron, edulis, versipellis, scaber.
Polyporus intybaceus, adustus, cuticularis, betulinus.
Polystictus versicolor.
Hydnum erinaceum, repandum, coralloides.
Odontia farinacea.
Irpex obliquus.
Phlebia merismoides.
Craterellus cornucopioides.
Thelephora laciniata.
Stereum hirsutum, purpureum.
Peniophora quercina.
Coniophora arida.
Corticium sub-coronatum.
Clavaria cinerea, cristata.
Lycoperdon perlatum.
Scleroderma vulgare.
Phallus impudicus.
Helvella crispa.
Coprobacia granulata.
Ciliaria scutellata.
Coryne sarcoides.
Peziza aurantia.
Galactinia badia.
Cudoniella acicularis.
Nectria cinnabarina.
Xylaria hypoxylon.
Hypoxylon fuscum.
Diatrype disciforme.
Pilobolus crystallinus.
Ovularia obliqua.
Urocystis Anemone.
Claviceps microcephala.

Thanks are due to Miss E. M. Wakefield, F.L.S., for help in preparing this list.

The nomenclature of the discomycetes is that of E. Boudier which has been adopted by British mycologists.¹

In addition to the above, the following species were met with, and constitute new records for Epping Forest.

Russula punctata (Gillet) R. Maire.

Marasmius obtusifolius Rea. n.sp.

Psalliota hæmorrhoidaria Kalchbr.

Corticium confine Bourdot et Galzin.

Corticium sulphureum (Pers. non Fr.) Bres (= *Phlebia vaga* Fr.)

Hypochnus fuscus (Pers.) Karst.

Hypochnus rubiginosus Bres.

The *Marasmius obtusifolius* recorded above is new to science. It was found by Mr. C. H. Grinling, M.A., at the base of an old Hornbeam. At first sight it suggested *Collybia vertirugis* (= *Marasmius undatus*), but a more careful inspection showed very distinctive characters, chief of which were the projecting cystidia, easily seen on the blunt gills with a lens; also the large ovate guttulate spores. A specimen was sent to Mr. Carleton Rea, who will describe it fully with the usual Latin diagnosis in the transactions of the British Mycological Society. Meanwhile the following description may be given:—

Marasmius obtusifolius Rea;

Pileus 1–2 cm. white with tawny centre, membranous, rather flat, smooth, grooved; margin at first involute.

Stem 2–4 cm. long. 1 mm. thick, tawny with apex white, solid, velvety.

Gills pale, adnate, anastomosing near stem to form a ring 2 mm. wide, distant, equal, very obtuse and thick, the edge under lens bristling with cystidia.

Flesh white, thin, without smell or taste.

Spores hyaline, broadly ovate, 14–15 x 10–12 μ . guttulate.

Cystidia numerous, fusoid-ventricose. 95–145 x 17–25 μ ., with globular apex 14–18 μ . Cuticle of the pileus with sub-globose or pyriform cells 20–23 μ dia.

Miss G. Lister, F.L.S., reports on the Mycetozoa as follows:—

The route taken, through the Birch Hall woods, across the forest by the Furze Grounds, the Keeper's Cottage, and Monk Wood to High Beach, afforded a varied hunting ground. Part of the Chingford forest was also searched with good results by Mr. Ross in the early morning, before he joined the main party at Theydon. The previous fortnight had been very dry, yet, thanks to the brilliant day and the efforts of many collectors, twenty-three species of Mycetozoa were found, whose names are given in the following list.

Physarum nutans Pers.

P. bitectum Lister. One sporangium only on a dead leaf.

Fuligo septica (L.) Gmel. In immature condition and also old and weathered.

¹ Mr. J. Ramsbottom has drawn up an excellent list of the new names; see *Transactions of the British Mycological Society*, 1913.

Craterium minutum (Leers) Fr. A few sporangia only.

Didymium nigripes Fries. A single patch of grey sclerotium was found. The sporangia in wet seasons are often in vast abundance on dead holly leaves in the forest.

Stemonitis fusca. Roth. Weathered sporangia only.

S. fusca var. *confluens* Lister. A fine specimen of this curious confluent form was obtained.

S. ferruginea. Ehrenb. Not common in the forest: one group of sporangia was collected.

Comatricha nigra (Pers.) Schroet. Weathered sporangia only found.

C. typhoides (Bull.) Rost. In perfect condition on decayed wood.

Cribraria vulgaris Schrad. var. *aurantiaca* Meylan on dead oak: this and the succeeding species usually favour coniferous wood.

Dictydium cancellatum (Batsch) Macbr. on dead oak; not common in the forest.

Reticularia Lycoperdon Bull. Two aethalia were found, one immature and cream coloured, the other rusty brown and mature.

Lycogala epidendrum (L.). Fries. One weathered aethalium only found. The last two species abound in summer, but are infrequent in autumn.

Trichea affinis De Bary. One group of pale yellow sporangia was obtained.

T. scabra Rost. Fine developments of this handsome species were collected on dead wood; the sporangia while still moist are shining olive-brown in colour; when dry, the walls rupture and the rich orange spores are exposed.

T. varia Pers. This also was found in abundance, both in its opaque white immature stage and mature ochraceous condition.

T. decipiens (Pers.) Macbr. Two unripe sporangia only were found.

T. Botrytis Pers. Several sporangia were obtained on dead wood with *Dictydium cancellatum*.

Arcyria incarnata Pers. One group of sporangia.

A. denudata (L.) Wettst. This beautiful crimson species was found on several old stumps.

A. pomiformis (Leers.) Rost. The scattered buff sporangia were seen on fallen oak boughs.

A. nutans. (Bull.) Grev. One gathering only was obtained.

Perichaena corticalis (Batsch) Rost. This was found in great abundance on an old poplar log resting among wet grass and rushes. The plasmodium had in some places crept away from the wood and matured on the grass blades, an unusual habitat for this species.

Badger at Laindon Common.—At the Meet of the Essex Union Hounds at Hutton on October 18th, the hounds, working towards home, drew Frith Wood, Laindon Common, where they found and killed a badger weighing 30 lbs., the second one this cubbing season.—*Essex County Chronicle*, 24 October, 1919.

EXTRACTS FROM SOME LETTERS FROM
JOHN BROWN, F.G.S., OF STANWAY
TO S. P. WOODWARD.

WITH NOTES BY A. S. KENNARD, F.G.S. and B. B. WOODWARD, F.L.S., etc.

JOHN BROWN, of Stanway, has for so long been recognised as an Essex Worthy that no apology is needed for this communication. The letters are thirty-six in number and were written to the late S. P. Woodward. The earliest is dated October 29th 1841 and the last May 31st 1845. They are at present in the possession of one of us (B.B.W.).

An excellent memoir of John Brown by Alfred P. Wire was published by this club in 1890¹, and no new facts are disclosed in these letters. On reading them, one is impressed by two things. Firstly, his intense regard for absolute accuracy and, be it remembered, this at a time when its importance was not so fully recognised as it is to-day. Secondly, the loveable character of the writer, and it can be said of him without exaggeration that he was a true gentleman. There are, of course, many passages of ephemeral, or personal nature, which we have deleted, but the remaining portions constitute a solid contribution to Essex Geology. We have added a few explanatory notes at foot.

STANWAY, Octr. 29th, 1841.

I am very sorry that my duplicates of fossil Freshwater shells are at this time rather scarce with me. [I] have given most of them away to numerous friends; but I beg your acceptance of a couple of the *Unio littoralis* (Drap.), the most perfect specimens I have by me at the time. Of the smaller species, I have parted with the whole of my duplicates.

With regard to recent land and freshwater shells, I should think that Mr. T. B. Hall, of Coggeshall, could assist you. He has a good collection and is an indefatigable student.

STANWAY, Jan. 6th/42.

I have great pleasure in sending you the *Planorbis* which Mr. I. D. Sowerby calls "new," but I am sorry that the helix is fastened on to a card with many other fossils, and from which it is very hazardous to remove without breaking, and it is the only specimen I possess; but I understand from Mr. Sowerby that he has retained a specimen or two, and, if you apply to him, without doubt he will show you them.

Allow me to observe that I think it will be fair and right to see Mr. Sowerby, of Camden Town, and speak to him, if you think different from that gentleman respecting the species in question. I have no doubt you will do this, and so if you please I will leave the matter in your hands. And, moreover, you will then have an opportunity of examining with him the helix stated by that gentleman to be also "new."

¹ ESSEX NATURALIST, vol. iv., 1890, pp. 158-168, a Biography with Portrait and List of Geological Papers.—ED.

STANWAY, March 27th/42.

I thank you for the communication just received, in answer to which I beg leave to observe that I made no mistake when I sent you the only specimen of *Planorbis*, which Mr. Sowerby states to be new. I merely submitted my Clacton shells to that gentleman to have specific names attached to them, and those of *Planorbis* which I sent to you were the identical specimens which Mr. Sowerby named and sent back to me. Of that you may rest assured; and if there is any mistake in naming the shell in question, the responsibility rests not with me. My judgment, I confess, is not sufficient to detect and name new species; but I must allow that there does appear to be some analogy between the Clacton and recent species. But will you not allow that *Plas* (= *planorbis*) from the latter locality is more flat on one side than can be seen in any of the recent shells of *Plas nitidus*? But I am not qualified to maintain the controversy. I shall, therefore, resign it to other hands.

I anticipate the pleasure of seeing Mr. Morris's work on the fossils of the various formations. Extensive discoveries have been made in this department of science since the period in which your highly respected father published his interesting work on the same subject. Mr. Morris has considerable advantages over former authors in this respect, and I have not the least doubt that he will do full justice to it.

STANWAY, April 26th/42.

Whatever fate awaits the *Planorbis* in question, all I can say is that they are the identical shells that were sent me by Mr. I. D. C. Sowerby as new, and which he named *P. helicoides*.

As I shall not start for Norfolk for a few days to come, I should gladly perform any message or commission which you may charge me to do for you. I shall not fail to measure the humerus you speak of, and to do the message to Miss Gurney. And, in the meantime, have the goodness to send me the dimensions of the one in Koch's Museum, and I will compare it with one of my own, as well as that of Miss Gurney.

And, as you are so happy in making sketches of small shells, etc., I doubt not you will be equally so in the affair of the Mastodon; therefore pray let me have one, and I will carry it to Norfolk with me, to show to Miss Gurney.

Mr. S. Wood paid me a short visit one day during his sojourn at Walton, and he then mentioned the distortion of the fossil skeleton in Koch's Museum. Probably the distortion is owing to the bones belonging to various animals being made to compose one skeleton?

STANWAY, Sept. 1st, 1842.

I should esteem it a favour your returning at your convenience the *Planorbis* which I forwarded to you some months ago, accompanied with Mr. Sowerby's letter, having his authority for its *specific name*.

It was the only shell which I had at the time, which makes it the more valuable, being that on which Mr. Sowerby made his remarks at the time.

STANWAY, Sept. 21st, 1842.

I should have been most happy if you could have called in passing or repassing, but, as it is, I think you had better keep the *Planorbis* till I see you, which I will do the first opportunity, and we can then compare them with those of your own Cabinet.

In your letter you say "I am sure you will pardon me for insisting on this." My reply is that I thank you for this investigation, and I should not have that high opinion of you that I now have "if you were to drop the matter through a false notion of courtesy, etc." It was for

STANWAY, Novr. 7th, 1842.

Since you were at Stanway, I have collected a few species (*sic*) of *Acme fusca*, *Helix lamellata*, and what I thought was *H. fulva*, but you call *spinulosa*. You say in your last letter that neither Mr. Wood nor Mr. Morris has any of these shells. I, therefore, shall be happy to send them through your hands to those gentlemen. You can divide them as you please, not forgetting yourself if you are in need.

The price of the barrel of oysters that I sent to your friend at Dereham is six shillings, but that can be settled when we meet.

The part of the Copford deposit from whence I collected your shells is, doubtless, recent, all the shells being such; and among others I have collected *Physa hypnorum*, but in a sub-fossil state. The shells are perfectly white, having lost all their animal matter, and are remarkably tender and fragile; and this upper part of the deposit is more recent than either the Clacton or Grays formation, but not so the lower beds. The latter are of the same age as the freshwater deposits of Clacton and Grays.

The great hollow that contains the Copford deposit appears to have occupied centuries to fill it up—nay, many centuries; for Mammalia were in existence when the lower beds were forming that are extinct now, and were not in existence when the two feet of clay and peaty matter were forming, and of which I collected the shells that are the subject of this letter, and which I will send immediately after I have ascertained the safest method.

I have found *Pupa substriata* amongst the Copford fluviatile drift, which I shall send with the others.

STANWAY, Novr. 12th, 1842.

Should you feel inclined for a trip during the Xmas holidays, and can find time, you shall find a ready welcome here. I generally have a domestic circle on Xmas day, and after that I am more at home with those that love grubbing for fossil bones, snail hunters, and stone breakers, etc.; and among that group you will be admitted with a cordial welcome.

I have much pleasure in sending you subfossil shells from the Copford deposit. I shall leave you to distribute them as you think fit among your friends, and when you want any more for them, I should be most happy to supply you.

STANWAY, Novr. 25th, 1842.

I received a letter of thanks from the Geol. Society for the shells which I, with great pleasure, sent you to distribute as you pleased; but I understood that you wanted them chiefly for private friends. Had I thought that you would present them to the Geol. Socy. I would have sent a quantity more worthy of their acceptance, and it is still my intention to do so. I will send a suite of all the species found in the Copford deposit, with a new Section; for, at the time I sent the one you alluded to in one of your letters, this part of the deposit was not discovered. The cuttings for En. Co.'s Railway has laid this interesting bed open.

It is my intention also to prepare a suite for the British Museum; thanks to you for the suggestion.

The small *Cyrena*, which you allude to in your letter, I think must have come from Grays. I do not remember ever seeing any in the Clacton deposit. Ask Mr. Searls Wood whether he has met with any. He has studied that deposit quite as much, if not more than I have.

Many thanks for your kind offer of what species of recent shells I have not. When I have the pleasure of your company here, you can see what species are wanting. I am almost ashamed to ask my friend Hall for more shells. He has already been very liberal to me in that respect.

I shall now prepare for my London journey forthwith (*i.e.*, collect the shells for your Society—viz., the Geological—and the British Museum); and if, in the fitness of things, it so happens, probably you will have no objection to introduce me to Mr. Gray, whom I should be pleased to know more about.

I have been upon the *qui vive* ever since I received your last letter respecting the small *Cyrena*. It is not very unlikely to find it at Clacton, although it has escaped my notice, as there is a close relation between that and the Grays deposit with regard [to] *Unio littoralis*; but Mr. Scarls Wood can set that matter at rest instantly.

STANWAY, Decr. 3rd. 1842.

I have selected a suite of land and freshwater shells from the Pleistocene deposit at Copford. I have devoted all the time I could spare from my ordinary concerns to this selection for the British Museum.

I have had no assistance, and some of the shells being very small, especially those of the *Pupa* and *Vertigo* races, I should esteem it a favour if you would have the goodness to divide them before presentation.

When you see them, I think you will see occasion to alter the list which you stated Mr. Morris had got of shells from the Pleistocene deposit.

I grant you that this deposit, although not so ancient as those at Grays and Clacton (which were, doubtless, contemporaneous), still, the bed from which the whole of these shells were taken is two feet below the present surface, as before mentioned, and is covered by a bed of clay, in which are to be seen various pebbles, flints, and nodules of Chalk, that have been drifted from the "*till*" after the bed of shells was deposited, forming a true Pleistocene bed.

All this I shall endeavour to illustrate by a section which I intend sending or bringing, with a few more shells for the Geological Society, when I come, about the 13th; although I shall have much to do to accomplish it, as the days are short and dark, and many of the shells very small—so much so, that I have a difficulty in seeing them by candle light.

STANWAY, Jan 10th, 1843.

The packages of shells, which I have now sent, have been ready for some time.

The packet of shells for the British Museum you can present when you please, after you have looked them over. I am certain that you can improve upon the divisions which I have made, and I should esteem it a favour if you would have the goodness to do so for me.

Those shells for the Geol. Society you can introduce to the Museum as you please. I have received one letter of thanks from the Secretary through your kindness, but you know the routine better than I can inform you, and I leave it to you.

I did not pay the carriage for this reason: I thought the not paying in the first instance would insure a certain and sure delivery of the parcel. I will thank you to pay for me, and I will repay you when I see you, which I hope will not be long first.

With regard to the corals from the Copford detritus: although there are many species or varieties, still I cannot find more than one that corresponds with the crag coral. All the others are dissimilar, that I have noticed. One coral from the gravel and one from the Suffolk Crag correspond, but this similarity is confined to structure only, not to external form.

STANWAY, Jan. 27th, 1843.

Please receive my very best thanks for the highly interesting and

5 *Corbicula* [= *Cyrena*] *fluminalis* does occur at Clacton, but it was not recorded from there until 1866, when S. V. Wood, jun., incidentally noted that though his father had failed to find it, the species had been found by the Rev. O. Fisher.

valuable list of species which you kindly sent me in your last communication. It does you very great credit. I have no doubt of its correctness; and I beg leave to observe and to acknowledge to you that you are among my most valuable and talented correspondents, if not foremost among that number. But *entre nous*; and long may we enjoy each others friendship without abatement or alloy, even up to the end of the chapter.

With regard to the memoir to the Geol. Society, mentioned in your last letter, I beg to observe that I have drawn a section already of the recent cuttings of the Railway which exposed the bed from whence I collected the shells that compose your list.

In the same sketch, I have represented the Freshwater formation that underlies the Pleistocene beds in geological order, but is more than a hundred yards from those beds. From the former I obtained the *Valvata* formerly sent, which was, I remember, very soon after that I had discovered the lucustrine (*sic.*) deposit.

This position of the strata, you will see by the section, is quite distinct from the Post Tertiary beds, being cut off from them by the upper bed of diluvium, which covers the lucustrine beds.

This sketch I could send, accompanied by a short memoir and a pretty long list of fossils from the deposit of detritus below the Freshwater beds, which Mr. Sowerby supplied more than two years ago, and which have not been published heretofore.

My collection of fishes' teeth, which you was so kind as to name for me as far as you could, I found in this detritus.

As to the corals: an impenetrable mystery hangs over them, but, if desirable, I could send them, and probably some of the gentlemen present would recognize some of them.

Or shall I draw up a short memoir on the Pleistocene beds only, to accompany your list for the Annals? the Freshwater beds being recorded in that work already? Pray which of the two plans shall I follow?

Mr. I. D. C. Sowerby has had by him for a long time past a variety of new *Foraminifera* from the Copford detritus, to be figured; but up to the present time nothing that I am aware of has been [done] with them.

The work of Professor Ehrenberg was waited for, to see if they corresponded with any of his plates; but I never could find out that that was the case. I believe his *Foraminifera* were more minute than mine.

A neighbour of mine, Mrs. Mills (the head of the firm of Mills and Co., Bankers), has received an interesting fragment of a fossil Tusk from Grays, 2 feet 7 in. long, 6½ inches at its largest diameter, and 4½ at its smaller one. At the request of that lady, I have mounted it for her, and a fine specimen it is. I shall be happy to show it you at some future time.

STANWAY, Feb. 4th, 1843.

Many thanks to you for your useful hints respecting your list of shells. The same is also due from me to our excellent friend, Mr. S. Wood, for his observations, etc.

I have sent you at this time some of the desiderata, by way of completing the list, and I hope to meet with the remainder by the time I see you, if I do not send them before. I have also sent you the Section of that part of Copford Brick-field in which the beds occur whence the shells were derived, with a short Memoir to lay before the Geol. Society.

The Teeth and Corals being upon boards, it is difficult to send them with the Memoir and Section. But will they be wanted at all? If so, I must either send or bring them with me. I last night met with some perfect specimens of *Aplexus hipnorum* [*sic*] which I beg of you to accept, with a few more *Clausilia* [*sic*].

I send also a few specimens of *Cyrena* from Grays.

Feb. 10th, 1843.

I have sent more of the desiderata, by way of completing the list, and

I must remark that I really feel much obliged to you for the exercise of my little knowledge of conchology, which has lain dormant so long that I am rather doubtful of myself when I am dividing the shells. I think I am now sending you *Pupa umbilicata* and *marginata* with *Zonites radiatulus*. If I am correct in the latter, I can send you more, and shall have great pleasure in doing so, both for your own Cabinet and for that of our friend, Mr. Searls Wood.

The teeth in *marginata* were in some of the shells obscure; in others wanting; but that appears to be the case frequently in that species. Neither these shells nor *umbilicata* are numerous in our Pleistocene beds. Those now sent are all that I have met with at present.

I must beg you to pardon my interrupting you so often. I do it lest I should forget those species which I have not sent in the first instance, and my rural affairs claim much of my attention just now, as the Spring is advancing and prices of our produce is most diminished, the land must yield all that is possible to make up for the scanty price and to provide for the tax gatherer. But this is a digression of an unpleasant kind, which I beg you will excuse. Those considerations shall not divert my mind from my favourite pursuits.

I received a letter from my friend Mr. Hall this morning, stating that he has been seriously ill, which accounts for my not seeing [him] at Stanway for some time past.

STANWAY, Feb. 14th, 1843.

I shall feel, I hope, all your kindness, and that of Mr. Wood, in acting as you please with respect to my Paper. I have never experienced anything but kindness from both of you, and I shall leave the whole of the management to you and that gentleman.

I think your term "Railway beds" will answer every purpose for the occasion, and is, in my opinion, a good term. But allow me to ask you, do not you think that the beds in which extinct Mammalia have been found are more ancient than the "Railway beds," in which the fossils are all recent? But we will not dispute about terms now; that you have adopted is good for the purpose.

I think the railway beds lie over the diluvium; at least, that is my impression at present. But we will look at the section more closely when you are at Stanway, which I look forward to with high anticipations, whenever you can find an opportunity.

I have sent your list of shells to the Annals with your name attached, with a short Memoir.

STANWAY, March 24th/43.

In casting my eye over the last list which you so kindly sent me, I find that you have no specimen of the "slender var." of *V. pygmea* [sic]. Having a few duplicates left, I have put a few into the bottom of the quill for you, and also one or two specimens of *V. pygmea* [sic]. The latter are extremely scarce with me, more so than the former.

The slender variety which you allude to in your list I think you will find to be *V. alpestris*, of Authors. I have also sent you a few of the sinistral shells, *V. pusilla* and *V. angustior*—all I have at present; but there are more in the bed at Copford, if more are wanted.

I have found in all from these beds eleven species of the genera *Pupa* and *Vertigo*, including two var. of *P. marginata*.

The Helices baffle me compleatly, in making out the numerous species which occur here. I should be thankful to you if you could come and assist me, if it were only for a day or two. Our Rail will be open for passenger traffic throughout the whole line next week. There is great difficulty where shells have lost the periostraca, and the specific distinctions are not very striking, to make them out exactly; yet, with the

assistance of Gray's last edition, I have done quite as well as I expected when I first began these new beds.

You doubtless remember that, when you had the goodness to introduce me to Mr. Forbes, the successor of Mr. Lonsdale, he was so kind as to offer me a few of the *Foraminifera* and the sand containing them, the result of dredging in the Mediterranean [sic.] Probably the multifarious duties which he is now engaged in may drive his promise into the river of forgetfulness. I would let it be for the present, but, if he takes too large a draft of the water of Lethe, perhaps you will be so kind as to speak a word in season for me at some convenient moment.

STANWAY, March 28th, 1843.

I have just found a solitary specimen of the var. of *Z. rotundatus* which you showed me at the Geol. Society, and which Mr. Wood has two of in his Cabinet from the same locality as mine, viz., Copford.⁶

STANWAY, May 8th, 1843.

Many thanks are due to you for the information respecting the disposition of the Till and Gravel of Norfolk, contained in your last letter. It will turn out ultimately that there is no regular sequence of the detrital beds in the east of England. In my neighbourhood, the Till, in several sections, covers the red siliceous gravel: in others, the red gravel occurs over the Till. Your section in the letter shows the Till covering gravel; while, nearer Norwich, you saw "the Till covering red gravel at Porling."

Since you left me, I have received several offers of exchange of other fossils for my Copford shells. I have just found a variety, or a distorted specimen, of *Zua lubrica*; but I have hunted in vain for another specimen of *rudivata*. That variety is indeed scarce. Considering this, how very singular it was that Mr. Wood should obtain two specimens of that species with the shells I sent him.

I should esteem it a favour if you would correct the list of the Copford shells, should it require it, previous to being printed. I forget whether I had found a specimen of the large *Valvata antiqua*, figured in *Mag Nat. Hist.*, p. 547. When you ~~was~~ here, I met with a solitary specimen. It has lost its animal matter or albumen, and has the same appearance of age as the rest of the shells of this deposit. Here some species of shells were in multitudes, while others (such as *Valvata*, *H. ruderata*, *Bithinia*, and others) are almost excluded; while other species are quite so.

I have collected a good specimen or two of *Helix nemoralis*, from the blue lucustrine clay at the Clacton freshwater deposit, since you left Colchester, and two or three specimens of, I think, *Unio pictorum*; but they are much mutilated by the removal, owing to having lost their animal matter. I think Mr. Wood obtained this shell from Clacton.

In breaking up the bed under the cliff which contains the bones, etc., I saw some very large *Unios*, which I took to be *Anodon cygneus*, but so soft that they would not bear touching. The stratum in which I found the helix is 25 feet below the present surface.

Having occasion to unpack some shells which I gave to our Clergyman, to be sent to Oxford, from the Copford beds, I met with three specimens only of *Bithinia tentaculata*, which I remember very well finding. That is a scarce species, but still it is found here and ought to be added to the list. I have no doubt I shall find more in the course of my progress, and I will reserve a few for you and Mr. S. Wood.

Among the shells for Oxford, I have put a few specimens of the three-toothed *V. pusilla*, and have introduced it as a var. of *pusilla* or a new species. I do not know the Oxford conchologist, but I shall probably hear something more about it. Its external form, less number of teeth,

⁶ This refers to *Pyramidula ruderata* Studer.

here

difference in striæ, etc., will probably establish it a var., if not a new species; but if these characters are fixed, it is, doubtless, a new species. But you can set this matter or not as well as anyone I am acquainted with, and I shall feel additionally obliged to you to do so at your convenience.

STANWAY, May 24th, 1843.

I have been much importuned by several collectors in London to send them suites of the Copford shells. In some instances I have done so, and from one gentleman I learn that the sinistral species, which I think you said was a variety of *V. pusilla*, is "*Vertigo angustior*"; and he tells me that he is confirmed in that conclusion by Mr. Sowerby, but he does not say which of the Sowerbys, but I suppose Mr. G. S.

I state this to you as you told me no one had seen it as a "recent shell, and that its claims to specific distinction are at present doubtful."

When you see Mr. S. Wood, have the goodness to ask him if I sent him the species in question, and his opinion respecting it; and, if I have not sent him the species already, I will do so as soon as I hear from him or you.

Miss Barker, of Colchester, to whom I sent a quantity of the unsorted shells from Copford, has sent me a list of shells which she has collected, and among them is *Helix rupestris*; but I have my doubts in that matter. I cannot find another *runderata*, although I have not searched in a careless manner for that species. Could you favour me with a shell of that species, a recent one; as I am told that some of our collectors have obtained them from the collectors of foreign shells. Merely as a loan, I should be glad of one, and would return it. Do you know whether Mr. Morris has found any of this species at Grays at any time? He has long laboured in that part of the field. By finding this species at Copford, with so many recent species, I should think it very probable that it is living in our Island at the present day. When you see Mr. Morris, please to give my best respects to him; and, if he can spare me a specimen of *runderata* from Grays, I should be most happy either to return it or send him the Copford shells for it.

As I think, time is always well spent in ascertaining or confirming a fact; and that is the principal object in my writing to you at this moment respecting the *Vertigo*, before it has escaped my memory.

STANWAY, May 27th, 1843.

I have this week found (for the first time) a few specimens of *Zonites pygmea* [sic.], and I have great pleasure in sending you about a dozen of them. They are from the debris of the Copford Pleistocene beds. They are at your service and disposal, and if you think a few specimens will be acceptable to the Society, I will begin the search anew; but this species is not very abundant here. You and Mr. S. Wood are the only friends that I have sent this species to. I had not observed them when I wrote last to you, or I should not have troubled you at this time, as I am aware of your multitudinous duties; and you can answer me when most convenient.

STANWAY, July 29th, 1843.

In looking over the sand from Clacton, I find the shell which Mr. S. Wood has found so many of: I mean the *runderata*. It is singular that this is the first I have met of that species, when that gentleman has obtained so many. It appears to have existed in that locality in tolerable abundance.

STANWAY, Novr. 4th, 1843.

In carrying out your suggestion respecting the shells of the Copford Post Tertiary beds, laid open by a cutting for the Eastern Counties Railway, I really think there can hardly be any place in England that

affords a better opportunity for collecting a suite of British land shells than the locality in question, and especially the more rare species. You, Sir, have determined 36 species, and three more species have been added since, viz.:— *Helix rudrata* (Studer), *Vertigo angustior*, and *Bulimus obscurus*. In all, 39 species.

The Freshwater species found up to the present time are nine in number, making in all 48 species; and these can be collected with such facility, the individuals of each species being so numerous as to sufficiently reward anyone who wishes to possess the small and rarer British land shells.

It is an excellent suggestion of yours to boil the peat. It is true I have collected them all without this aid, but many of the *helices* are broken at the mouth, by, doubtless, so much washing and stirring about in cold water, which I have no doubt boiling in my large brewing copper would have obviated. Some of the peat is hard and compact, so much so that thousands of these fossils are broken in trying to disengage them from the matrix; and, as was before observed, the shells being sufficiently numerous to reward the process, boiling is certainly a remedy, and which I shall put in practice in my future searches.

Twelve species of *Helix* have already been found, and there appears to be many more of the genus, but they are at present undetermined.

The two deposits at Clacton and Copford are the only localities, if I mistake not, where *Helix rudrata* has been found as a fossil, and as a recent species in England [it] is, I believe, unknown, although it probably may yet be found as a native of England, seeing that it has been met with among the fossils of two distinct Freshwater deposits that are divided by a space [of] 20 miles. The Clacton deposit has yielded the greater number of specimens of *rudrata*.

There is a stratum of red sand in the cliff at the latter place, about three feet above high water mark, where *Helix rudrata* is more frequently found; while in the Copford Post Tertiary beds only one specimen has been found at present, after diligent search. But this paucity of *rudrata* in the Copford Post Tertiary beds is amply made up by the abundance of *Helix lamellata*, *H. aculeata*, *H. fulva*, *H. pygmaea* [sic.], *H. radiatulus*, [sic.] *Vertigo angustior*, *Pupa anglica*, etc., etc.

Both the Freshwater deposits of Clacton and Copford have features peculiar to each. The Copford deposit is abundant in shells that in other localities are rarely met with, though probably none of them are extinct; while that at Clacton possesses species that are extinct in England, but now found living in France—viz., the *Littorina*, *Unio*, and *Paludina minuta*. The value of the discovery of the Clacton deposit is also enhanced by finding *Vertigo cylindrica* and [*H.*] *rudrata*. But the fossils found at Clacton point to a much higher antiquity than those from the Post Tertiary beds at Copford, but the deposit below the Post Tertiary strata at the latter place appears by its mammalian fossils to be contemporaneous with that at Clacton.

It is very delightful to trace the relative ages of these deposits and determine them by their organic remains. Peace, rest and happiness to the *manes* of the late Dr. Wm. Smith, for the key which he had the honour of find into gunlock the mysteries which belong to these pursuits!

STANWAY, Decr. 2nd, 1843.

I find your friend Mr. Harris a very valuable correspondent. I have received from him some valuable specimens both of Green sand and Chalk fossils, Gault . . . Teeth and Palates of fish.

You mentioned *Valvata antiqua* in your last letter. If I mistake not Mr. S. Wood has found that species at Clacton, for he has searched those beds much more than I have, who live within 17 miles of them.

W/H
S/P

STANWAY, March 23rd, 1844.

As I am indebted to you principally for my correspondence with your friend Mr. Wm. Harris, of Charing, and also for the kind assistance which I have received from that gentleman in obtaining some fossils from the Kentish deposits, I beg to inform you that I am now contemplating a visit to him, by invitation, the early part of next month (April).

At your leisure, I should esteem it a favour if you could inform me whether Professor Forbes has received a parcel containing some fossil *Foraminifera* from Mr. I. D. C. Sowerby, which I left in the latter gentleman's hands some time ago. The last time I was in town, he said he should send them to me, but as you stated to me that Professor Forbes wished to see some of the *Foraminifera* from our coralloid ground, I sent him a few species and at the same time wrote to Mr. Sowerby to send to Professor Forbes those he has, which I left in his hands for figuring, instead of sending them to me. Mr. S. has not written to me, and whether he has sent them to Prof. Forbes, of course, I cannot tell. When Mr. S. first saw these fossils, he states they were *new*, and ought to be figured; but subsequently he has altered his mind, and I shall be glad to submit them to the notice of the Professor.

I have recently obtained a fragment of a canine jaw, containing the last molar, very perfect, with part of another. I think it will prove to be that of the Bear. I have no doubt that your adroitness could restore the whole jaw on paper in a very short time. I am getting a mould made of it, and shall send a cast to our excellent friend, Mr. Charlesworth, and any other friends wishing for one. This specimen was dredged up at sea, off our coast. It is charged with iron pyrites, extremely heavy, and the fossil bears marks of very high antiquity.

STANWAY, Nov. 10th, 1844.

I think it probable that I may see you before long, and then I will bring you the *Terebratula* and anything else that you may want. In the mean-time, I send you a little rough sketch of the geology of the Essex coast from St. Osyth point to Harwich, and at the same time to ask you if you will have the goodness to make an enlarged one to illustrate those points where the recent shells lie in beds several feet above the present high water mark. I have collected from the several localities all the species I could find.

The bed of shells in the Colne valley will be the most difficult for you to sketch, as it lies ten miles from the ocean, although only about 500 or 600 yards from the River Colne on its western side. But what appears to me to be a difficulty does not to you. Probably you [will] think proper to make a sketch by itself of the valley and the bed of shells by the side of the Colne, but I shall be glad to have you to do as you please with it. You will save me a little time, if your other affairs will admit of your doing it for me, and I shall esteem it a favour and be much your debtor.

The geological feature of the valley could be represented without giving a picture of the valley. I do not know that the latter is needful, but I shall be very glad to have your opinion if there is any difficulty.

I am very sorry to say that our friend Hall is not clear of his difficulties yet. I went to his sale of books, and saw him and his young wife. It must have been a singular infatuation that induced him to chose such a time for marrying. He is now in search of a situation in some Museum. He says he will be satisfied with £100 a year. Do you know of any situation that would suit him? If you do, I am sure you would inform him or me.

STANWAY, Decr. 8th, 1844.

That part of your letter received this morning very much surprised me where you say that the "Paper was read last Wednesday evening,"

that is connected with the diagrams which I sent you to enlarge for me, and which I find you was so kind as to do. All that is very, very obliging of you ; but you have (undesignedly, I am sure) anticipated me with regard to the paper. That is the very thing I was preparing at home, and have now completed, and meanwhile I sent the diagram to you to ask you if you should have time to enlarge it for me, I knowing as I do your multifarious duties.

I had also collected and prepared three groups of fossils from the three localities which produced the Post Tertiary fossils ; in all, a considerable number ; and these, displayed on the table, would have given an increased interest to the paper. These I would have either brought or sent, and, after the paper had been read, I should have given [them] to the Society, provided they thought them worthy of acceptance.

However, as it is, I shall still offer them, as I consider the shells from the whole of these raised beds of high interest, especially those from the valley of the Colne.

I shall feel obliged by your favouring me with a copy of the paper or the thing itself, and I will return it again. I am sorry that I was not more explicit in my letter that I sent with the section, and shall readily pay any expense that may be incurred by my own neglect. And with the shells from the Post Tertiary beds, I will send the paper at the same time. There would be no harm in offering it to the notice of the Society, as it was my intention to send it through your hands in the first instance ; but, if I do send it, I must beg of you to lend it me for a short time afterwards, and, if you wish it, I will return it. But I must appeal to you in this, as in all other instances of etiquette with regard to the Geol. Society.

If you can spend a week or two with me this Xmas, I shall be glad to see you, to help me eat some of my poultry, etc., etc.

The Colchester people are about forming a Literary and Philosophical Institution. A Committee is formed and laws made, but they have as yet made no progress in raising money, which will be the next consideration. The Committee meets again to-morrow (Monday) evening. There are various opinions as to its success, the elements are so incongruous.

STANWAY, *Jan. 25th*, 1845.

I am much disappointed that I have not had the pleasure of seeing you before this, as I had anticipated, but I am sorry to say that I have been very unwillingly detained at home by my little agricultural affairs, which have not gone so smoothly as I could have wished. At Michaelmas last, my old servants were exchanged for new ones, that were strangers to my horses and cattle ; and to me it always takes a short time to get things settled in a farm after changing the men. But we are now getting more settled into our regular way, and I think long to break away and have a little relief, which I am panting to do the first opportunity.

STANWAY, *May 31st*, 1845.

I have just completely fixed up my Elk's skull and horns in my own house, which is very unfit for them ; but I am loth to disturb them again so soon, and it is dangerous to be taking them up and down so often. But their grandeur is lost in my low room.

I think very likely that the white bed you speak of at Orford is the upper part of the London clay stained white with the calcareous matter from the Cor. Crag, though you do not state whether the fossils are found in clay or sand ? There is a junction of the London Clay and Crag near to, if not at, Orford.

I am very glad to hear that our friend Mr. Hall is employed in a very large establishment in London, at a good salary.

NOTES—ORIGINAL AND SELECTED.

Clausilia biplicata, Mont. in Essex.—Having to wait for a train at Purfleet on September 5th 1919, I devoted a short time to the investigation of a not very productive looking chalky bank in the vicinity of the railway station, when, to my great surprise, the very first shell to come to light was a specimen of *C. biplicata*. On further search I found that there was a fairly strong colony on the bank, living at the roots of the scanty vegetation and amongst the chalk debris. I know of no one likely to have introduced the species, and assuming it to be indigenous there, it is an interesting addition to Mr. Wilfred Mark Webb's "Non-marine Molluscs of Essex" (ESSEX NAT., x., 1897-8, pp. 27-48 and 65-81), and the locality is also a considerable extension of its known range in the Thames Valley.—
F. B. JENNINGS.

Hooded Crow and Great Grey Shrike in Epping Forest.—On 2nd November 1919, I identified a Hooded Crow (*Corvus c. cornix*) in Epping Forest. The Hoodie was flying in a leisurely manner, low down, over Fairmead Bottom. It crossed the Epping high road and was lost to view.

A reliable observer who knew the district well, informed me that on rare occasions he had seen this crow in Epping Forest, but although I have studied the birds of the Forest for over ten years, this is the only occasion upon which I have seen one there.

On 25th December 1919, while on Warren Plain, my attention was drawn by a light coloured bird, boldly perched on a medium sized tree. My thoughts immediately turned to the Lesser Grey Shrike which I saw commonly in Macedonia. On putting my binoculars on to the bird it was disturbed, but fortunately flew towards me, and as it passed the view I obtained left no doubt in my mind that I had seen the Great Grey Shrike (*Lanius c. excubitor*). The shrike settled on another tree, again on the highest bough in characteristic shrike manner, and finally disappeared into the private grounds of The Warren.

On 11th January 1920, at the same place I again saw a Great Grey Shrike, probably the same bird. Records of this species in Epping Forest are remarkably scarce. Henry Doubleday, according to Miller Christy, had only seen one in the Forest. In

recent years the only other occurrence that I am aware of is the one recorded in *The Field* of 3rd June 1916, as having been seen on 24th May of that year.

WILLIAM E. GLEGG.

The Ancient Yew in Woodford Churchyard.—A copy of Richard Warner's "*Plantæ Woodfordienses*," 1771, in the Club's Library (presented by Mr. T. Fisher Unwin in 1915), includes an interleaved note opposite Warner's record of *Taxus baccata*," "The Eugh or Yew Tree," (page 166), as under, written in faded ink :—

" A most remarkable one in Woodford/ " Church Yard, the Dimensions of/ " which, as taken by Mr. Warner and/ " myself in 1774, and intended to/ " have been inserted by him in the/ " second Edition of this Work, had/ " he lived to publish it, are as/ " follow/	Feet. Inches.
" The Circumference of the Stem " close to the Ground 11 : 5/ " Do. of Do. 5 feet from Do. 15 : 2/ " Do. of Do. 7 Do. from Do. 17 : 6/ " where it throws out/ " 13 large Branches, some of/ " which are in Circumference 3 : 9/ " besides several smaller ones./ " Height 37 : 0/ " Circumference of the Branches .. 168 : 0/	

" J. SHEPARD, R[ector] of Woodford./1775."/

This famous tree, which is still flourishing, is mentioned by "A Gentleman," Dr. Hughson, Lyson, Mrs. Ogborne, Collier, Christy, and other topographers of Essex, but the above record is probably the oldest detailed account of the Woodford Yew, and is worthy of preservation by reason of its careful and well-attested nature.

To afford some data as to the rate of growth of this ancient Yew, Miss G. Lister, F.L.S., and Mr. A. Bruce Jackson, A.L.S., at my request, carefully measured the tree on January 4th 1920, with the following results :—

Girth of trunk close to the ground ..	12ft. 2½in.
Do. at 3 feet above ground ..	15ft. 2½in.
Do. at 4ft. 3in. above ground ..	16ft. 9in.

PERCY THOMPSON.

Attachment of the Greater Spotted Woodpecker to its Nesting Site.—During the past three years, Greater Spotted Woodpeckers have, despite discouragement, reared their young in a large beech in a somewhat secluded part of Epping Forest near Chingford. The species seems to have been partial to the area for many years, for until comparatively recently another beech with many woodpeckers' holes stood not far away. In January, 1918, much storm-damage was done to trees in the Forest, and a piece of this beech was broken off, but on January 19th the birds were "drumming" in the tree. They were constantly in the neighbourhood during succeeding weeks, and on June 15th a youngster was "chanting" in the nest hole. There appeared to be only one young bird, which came to the mouth of the hole whenever the parents were long away. On April 27th, 1919, the part of the tree containing the previous year's nest was fractured by the blizzard, but the branches growing from it met the ground and prevented a complete breakage, the stem being supported by the branches in a horizontal position and a fragment of undecayed wood being unsevered. On May 3rd drumming was heard continually in the neighbourhood, and next day a pair of birds was seen working at a hole in the beech. On May 18th that hole had been sawn through, but on May 25th the birds were discovered to have reverted to an old hole in the broken part of the stem, now horizontal. On June 14th youngsters were chanting in that hole, so that the evil-disposed person who sawed through the hole made earlier in the year did not get the eggs. The part of the stem containing the hole, where the youngsters were hatched in 1919, was subsequently sawn off (by permission of the Forest Superintendent) in the hope that it might show what further excavation had been necessary because of the horizontal position of the stem after the breakage; the hole was found to be very large and irregular in shape, the shape in one part being determined by the undecayed nature of the wood. On the side of the hole that, with the stem horizontal, was underneath, the wood and bark were reduced to the thickness of a quarter of an inch only.—J. Ross, *Chingford*.

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The specially-valuable feature of the Publications of the Club is that they are almost wholly local in character. The volumes (comprising over 6,000 pages) contain hundreds of papers on the Natural History, Geology, and Pre-historic Archæology of Essex. The articles are of the greatest interest to all persons having any regard for the County, and the scientific accuracy and detail of a large proportion of them make them of value also to students of the subjects named living elsewhere.

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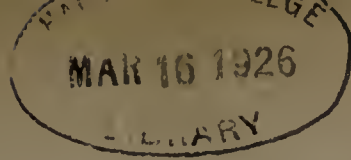
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assisted by
HENRY WHITEHEAD, B.Sc.

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SOME FIELD OBSERVATIONS ON ESSEX REPTILES AND AMPHIBIANS.

By FREDK. J. STUBBS.

1.—THE VIPER (*Vipera berus*).

TWENTY or thirty years ago, I believe, vipers were abundant in Epping Forest, but they are not so to-day ; and, I think, their entire extinction is but a few years distant. I saw one near Theydon Bois in the spring of 1910, but had to wait nine years before finding another, in spite of careful search in the most likely places during the weeks when the reptile is most noticeable.

Since 1910 several reports, from keepers and others, have been received relating to odd specimens seen or killed, generally in the Forest between Loughton and Epping, and especially near Theydon Bois. During this period I encountered vipers in small numbers on the coast, near Southminster, near Danbury, near Aveley, and elsewhere. Yet I could never view it as being a common Essex species, except, perhaps, in such places as Danbury, where, in 1911, a man killed 72 vipers, receiving a small reward for each one from the parish authorities.

In 1918 I had a trustworthy report of a viper, about 18 inches long, having been killed on the roadside between Theydon and the Wake. Several careful searches in the locality were, however, fruitless. The following spring I heard of two others as having been killed between Oak Hill and Debden Green, and on the 10th May (1919), Mr. Stanley Austin, Mr. P. W. Horn, and I made a special visit to the fern-covered slope at the extreme margin of the Forest, just below Oak Hill Farm. Here we found a viper, pale grey, with blackish markings ; but it was very timid, and disappeared instantly in the tangled thicket. A few minutes later, I saw a second individual, stretched across the twigs of a hawthorn and basking in the sun. It was promptly tossed out into the open and secured in a cap. The colour was a curious shade of greyish pink, the dorsal markings dull brick red. The coloration was protective in a very high degree, for it simulated exactly the two shades of the faded bracken which here matted the ground, so that we had difficulty in seeing it when the covering cap was cautiously lifted. I kept this viper for a week,

releasing it in the same spot ; and a minute later, Mr. H. G. Taylor and I saw the grey and black individual, and bagged this after an exciting chase. It struck repeatedly at our sticks, leaving drops of fluid, which dried like pale yellow varnish. This also was duly released in a few days, not in its old home, but about a mile to the north, near Ambresbury banks. Both were males.

In May, I heard of still another viper at Jack's Hill ; and also of a young man being bitten at the same place. I got into touch with the victim, and received a very interesting account of his unpleasant experience. He saw (11th May, 1919) the reptile curled up in the road, and jumped off his motor cycle and picked it up. While holding it in the right hand (it struck him as being strangely inactive), the beast made a sudden wriggle forward and bit the top joint of the left thumb. He sucked the two tiny wounds, bound his wrist, and cycled at once to his doctor at Leyton. The viper got away.

In five minutes the thumb began to swell, so that when he reached the end of his journey he could hardly hold the handlebar. In four days the swelling had reached the elbow, and the whole arm was dark purple and yellow, like a bad bruise. In about a fortnight the hand and arm were quite well again.

This, I fancy, is a typical case of viper bite. Dr. M. C. Cooke, in his little work on reptiles, mentions the case of a woman being killed by a viper in Epping Forest about sixty years ago, but these instances are rare. The late Mr. Leslie Hocking, of Danbury, was bitten by a small "red viper," exactly a foot long ; but although his doctor put him to bed as a precaution, he told me that the swelling hardly inconvenienced him. It is as well to remember that a viper is astoundingly swift in striking, and can manage to hit an object a foot away ; and, also, I have seen one strike quite three times, in different directions, in a space of time hardly more than a single second. In winter I have handled large vipers with impunity, and possibly they never bite at that season. In February, however, they are dangerous.

Vipers rarely feed in captivity, but will live for months. I had a curious experience with a Danbury animal, which I wanted to preserve alive. I knew that if you tried to tempt a viper with a house mouse the mouse nearly always eats the viper ; so I decided to try a field vole, which is, of course, vegetarian. The vole lived comfortably for some days with its terrible com-

panion ; but, one morning, I found that the vole had killed the viper and eaten the head and an inch or so of the body. Very likely lizards form a large part of vipers' food ; and we noticed that the common lizard was remarkably numerous in the Forest in 1919.

2.—THE GRASS SNAKE OR RING SNAKE

(*Tropidonotus natrix*).

is common in most if not all parts of Essex, and is really abundant at Theydon Bois. In a quarter of a mile, near the lake at Birch Hall, it is not unusual to see ten or a dozen snakes. They are, as a rule, very timid, and retreat beneath the dense thorny thickets, or project themselves like water voles into the lake. Nevertheless, we have sometimes managed to bag three or four in half an hour.

In Essex, the grass snake is very fond of water. Several times I have seen snakes swimming spontaneously across the widest part of a lake ; sometimes the head and three inches of the body are held above the water, but at times they swim with the tip of the nose and the eyes only above the surface. It is, too, not uncommon to see snakes entirely submerged, and sometimes a yard deep, exploring the recesses of a pond. While thus engaged the reptile looks like an eel, and must frequently be mistaken for the fish.

Repeated diving soon tires a snake, and if pursued in a boat the animal is utterly exhausted after about a dozen dives ; and so, too, is the rower, for the snake is extremely agile, and dodges about while under water. It is strange that the snake does not seek to escape by swimming to the cover of the bank without rising to the surface—a feat it is quite capable of doing, for I have watched snakes, when not alarmed, swimming for some minutes beneath the surface of a pond.

In spite of many authors, grass snakes eat toads ; and, perhaps, these form their chief food in Essex. I have often forced a bulky snake to disgorge its prey, and, at Theydon Bois, a toad has been the result in every instance. I have never seen a grass snake either in the early morning or in the late afternoon or evening, although I had excellent opportunities for daily observations at Birch Hall.

My earliest date for the grass snake is 17th March (1918); the following year I did not see one until the 18th April, but this was a cold spring. The 1st April is the average date. On the 30th March, 1912, while in Hainault Forest with the Messrs. Hocking, I made a grab at something moving in the dead leaves at my feet. It was a bunch of snakes; two at least escaped down mole runs in opposite directions, leaving me with a living knot twisted together in an extraordinary way; but this consisted of two snakes only. Christopher Parsons, in the April of 1845, near Rochford, fired his gun at a similar commotion in the ivy leaves on a roadside bank, and bagged nine snakes (cf. "Zoologist," 1845, p. 1027).

Out of the many Essex snakes I have handled, not one exceeded 38 inches in length, but in 1917, a Theydon snake, 34 inches long, was bulky enough to weigh exactly three-quarters of a pound. I came across it on a dry grassy bank, far from water and the colours were so dark, and the body so stout, that it looked very much like a large viper. Young snakes are seldom met with, unless they are unearthed from hibernacula. I have notes of a set of three, each twelve inches long, dug out on the 21st March; and, on the 7th December, of a brood of tiny creatures, no larger than those which emerge from the egg. An attempt to incubate snakes' eggs in my marrow bed proved a failure. Nothing seems to be known of the length of time before a snake is mature; it must be at least three years, and perhaps more.

3.—THE BLINDWORM OR SLOW-WORM (*Anguis fragilis*) is not markedly common in the county. Sometimes I have seen one in broad daylight, either on the move or basking in the sun, but the animal has never come my way while turning over logs, etc., in search of insects. Possibly it is common enough in large quiet gardens free from children or jays.

4.—THE TOAD (*Bufo vulgaris*).

Of this Essex batrachian I have nothing very novel to record. As with the frog, we have still much to learn about its habits and I have noticed that these points are handled with suspicious brevity in the works I have read, both British and Continental. How old is the toad before it is mature? Where do

the young ones hide themselves during the winter? These are a couple of questions often asked, and not yet completely answered.

In Essex the toad spawns from a fortnight to a month later than the frog, in waters where both species breed; but, I am convinced, there is a great deal of irregularity about the business. My toads, kept in a London garden, where they had a "natural" pond and an abundance of plant cover and animal life, spawned much later than truly wild toads observed in Essex. In 1910 my dates were 11th April for the fields, and 23rd April in the garden. In 1911 the dates were 10th April for wild toads, and 20th in the garden; while in 1912 my toads spawned 32 days later than the Essex wildlings, which had already deposited eggs on the 20th March.

Even in the wild state we find toads dropping their eggs on the ground before reaching the water, and when this happened in the garden, the earthworms fed on the threads—or, at least, dragged them far down into their burrows. Toads' eggs are frequently overlooked. Sometimes they resemble strands of black worsted, carrying no idea of eggs, and of course quite unlike frog spawn. One string which I measured was 16 feet long, and I estimated that it contained about 4,000 eggs, for I counted from 20 to 25 in different inch lengths.

In 1918, when toads were markedly numerous throughout the south-eastern counties, we thought that amongst the reeds round the lake at Birch Hall there were at least ten toads actually visible for each yard of the bank. The males, of course, predominated. We lifted one bunch from the water, finding it to consist of no less than twelve adult males surrounding the single female; and other groups which we handled contained from ten to three males to each nuclear female. The date this year was the 22nd March, but spawn was not seen in this water until a couple of days later.

The voice of the toad is a clear, almost bell-like, "honk, honk"; sometimes it sounds like the distant yapping of a young puppy; and it is uttered under water as well as in the air. The crooning of the frog is nearly over when the toad concert begins.

In Essex the first toads are seen in mild weather in February. Probably they never hibernate under water; although I have

found them in the company of frogs in such hibernacula as mole-runs, I do not think they ever join the frogs which sleep under water. A sleeping toad has the eyes tightly closed, and it can stand a good few degrees of frost, as I noticed in an animal which wintered under a broken plant pot in the garden. Indoors, captive toads, like frogs, often remain active throughout the winter.

I cannot find in my notebook any actual dates for the first appearance of the smallest "one year old" toads; but I record the next size (which, quite provisionally, I have long called the "two year old") in the Forest on the 27th April. The "two year old" individuals seem far more numerous than the next smaller size, and they are, I think, later to appear in spring. I have never seen either a "one year old" or a "two year old" in the water at any season of the year.

As soon as the eggs are laid (say after the middle of April) the adult toads, with the exception of a few laggards, vanish from the ponds; but, I have noticed for some years, they do not become evident on land until after an interval of two or three weeks.

From May to October toads may be seen in all parts of the Forest, often a mile or so from the nearest breeding pond. When crawling over the dead leaves a toad makes more noise than a fox crossing the same spot, as we have observed on more than one occasion. Without doubt, the reptile must destroy a great number of the defoliating caterpillars as the latter are preparing to pupate.

Sometimes, even away from towns or villages, we meet with toads which have lost an eye; and such victims are numerous among the colonies living in town gardens or in confinement. A good deal has been written on this matter, and the general opinion is that the damage is caused by a dipterous fly which lays its eggs on the skin or in the nostrils of the reptile. The larvæ eat their way to the brain, or, missing their way, come to grief in the orbit of the eye, in which case the toad recovers. The particular insect responsible has been named *Lucilia bufonivora* by a Russian naturalist, but perhaps special students of the diptera are not prepared to recognise this as a true species. In captivity, when toads are fed on bluebottles, it is only too common for the eggs in a gravid female fly to hatch out in the stomach and destroy the reptile. This is the more likely to

happen if the animal is sickly, and I have had myself awful cases of chameleons (and once a bat) destroyed in this way. The greenbottle, so disgustingly common in London gardens (*Lucilia sp*), will lay its eggs in the nostrils of a living tortoise, but I have never seen this happen to a frog or a toad. One-eyed toads, I am sure, are animals which have swallowed either blue-bottles or greenbottles.

5.—THE FROG (*Rana temporaria*).

I recorded "one year" frogs on the 17th March, in 1917; and, as with the toad, they seem to be constantly earlier than the "two year old's." A collector who supplies the frogs used in London hospitals and schools has often assured me that he finds all three stages wintering together at the bottom of ponds. These congregations are very great. In October, 1912, he took 1,400 frogs in two days from a drain at Uxbridge; and in December, 1918 he showed me part of a batch of 800 taken from a small pond. These, by the way, were crooning vigorously. I have heard frogs, deep in the water, crooning as late in the year as October at Theydon Bois, and it is not unusual to come across lively individuals at all seasons when using a net in ponds. The dealer I mention believes that when a pond is totally cleared in midwinter, it will soon be occupied again. This means, of course, that frogs are more active on mild winter nights than most of us think.

The lake at Birch Hall accommodates many frogs, which spawn always in colonies. In 1914, 15, 16, and 17 the egg masses were scattered along a short stretch of bank on the western edge near the boathouse. In the latter year the eggs were all laid together in a single batch. During these years the increase in an area of Lesser Reed-Mace (*Typha minor*) quite altered the nature of the margin, which before was clay, thickly covered with *Fontinalis* and *Hypnum*. The change, apparently, caused the frogs to migrate; for in 1918 the spawn was deposited in a huge patch at the shallow western corner of the lake, a hundred yards away from the previous station. They used the place again in 1919, when much of the spawn was frozen black by the hard weather of March and April.

During the six years that the lake was under observation, I never saw frogs' eggs away from their circumscribed breeding

place ; and yet it is not at all rare to see two or more separate colonies in quite small ponds. At Birch Hall, the toads, while preferring the big reed beds, threaded their egg masses in all parts of the lake near the banks.

At Theydon Bois the exodus of the young frogs took place in June, when it never seemed to me a very striking phenomenon, and young toads are seen on land at the same time ; but, after the first heavy shower about mid-July (the 20th in 1915 and 1918, I note) young toads no bigger than bluebottles swarm everywhere in astonishing numbers. At such times the people can hardly be convinced that the little animals have not been rained down from the sky. In a few days these swarming hordes have disappeared.

6.—NEWTs.

It is difficult to understand how so many observations on Essex newts escaped my note book. For example, I cannot find any mention of the palmated newt,¹ which is certainly common in some areas at least. Near Theydon, in winter, I used to find both the great warty and the smooth newts hibernating either under damp logs or deep in ponds. In captivity, smooth newts may live for many months, right through the winter, without being seen anywhere except deep in the water of the tank. A Forest common newt with a double tail lived with me for nearly a year ; and a great warty newt from the same locality had, I noticed, the second toe duplicated on the left hind foot.

THE BRITISH YELLOW WAGTAILS.

By GULIELMA LISTER, F.L.S.

OUR common yellow wagtail is a regular summer visitor to the British Isles, and is distributed over the greater part of England from April to early September. In Essex it nests abundantly in low meadows and marsh land near the coast. Outside England it is comparatively rare, and appears to breed in small numbers only in west Holland, west France, and, perhaps, in Portugal, migrating in winter through the west of Europe to west Africa. It was first described by Willoughby and Ray in their "Ornithologia," published in 1676, where,

¹The Palmated Newt used to occur (and possibly still occurs) in a pond in the Forest at High Beach, Ed.

with accurate detail unusual for ornithologists of that period, the chief characteristics are noted, namely, the yellow under parts of the bird, the dull green upper parts becoming yellower on the crown, and the yellow eye-stripe. They named it *Motacilla flava*, supposing it to be the bird imperfectly described under that name by continental writers.

It was not till 1832 that Gould pointed out that the yellow wagtail of the continent differs from Ray's bird in having a blue-grey head and white eye-stripe ; he named this blue-headed bird *Motacilla neglecta*. For Ray's bird Gould suggested that the name *M. flava*, under which it was described by our illustrious fellow-countryman, ought, according to the established rules of nomenclature, to be retained.¹ The rules of nomenclature decree, however, that "we cannot go behind Linnæus,² and Bonaparte (nephew to the great Napoleon) gave to Ray's wagtail the specific name of *Rayi*,³ keeping *M. flava* L. for the blue-headed bird. At the present time our British yellow wagtail is no longer regarded as a distinct species, but as one of the many well-marked but closely related local races of yellow wagtail occurring throughout Europe and further east, and its full designation now is *Motacilla flava* L. subsp. *rayi* (Bon.) Hartert.

Meanwhile, it was discovered that the blue-headed yellow wagtail, *M. flava* L. *flava*, not unfrequently visits Britain. The first two British specimens were seen in Essex by Henry Doubleday in 1834, near Walton-on-Naze, and since then this form has been noted in many parts of England, in Wales and in Scotland, and it has bred in at least six English counties, including Essex.

Besides this, records have also been obtained of birds belonging to four other races of *M. flava* as occasionally visiting the British Isles ; namely, Sykes' wagtail, the grey-headed, the black-headed, and the ashy-headed wagtails. Sykes' wagtail, *M. flava* L. subsp. *beema* Sykes is a west Siberian race, having the crown and ear-coverts paler grey than in *M. flava flava* ; only two British examples have been obtained, one from Fair Isle, north of Scotland, the other from Sussex. The grey-headed yellow wagtail, *M. flava* L. subsp. *Thunbergi* Billberg (syn. *M. borealis* Sunder.), has a dark grey head, black lores and ear-coverts, no white eye-

¹See *Proceedings of the Zoological Society*, 1832, p. 129.

²That is, the year 1758, the date of publication of Linné's *Systema Naturae*, ed. x.

³See Bonaparte, *Geogr. and Comp. List of Birds, Europe and N. America*, p. 18, 1838).

stripe, and a white chin ; its summer home is in north Europe and north Asia ; of this form, a number of individuals have been noted on the east and south coasts of England, and amongst other records, " fair numbers " were seen on migration in Fair Isle, in 1908, 1909, 1910, 1912, 1913 ; possibly a pair remained to nest in 1906 on Romney Marsh, Kent. The black-headed wagtail, *M. flava* L. subsp. *feldegg* (Michalelles) Hartert, is a southern race, nesting in south-east Europe and Asia Minor, and occasionally straying into western Europe. The male in summer has the head and ear-coverts black, and all the under-parts yellow. Four British examples have been seen, in Sussex and Kent, and another, probably, in Norfolk. The ashy-headed wagtail, *M. flava* L. subsp. *cinereocapilla* (Savi) Ticehurst, is resident in the Mediterranean region, rarely straying further north ; this form has a very faint white eye-stripe, grey head, and darker lores, and white chin and upper throat ; the only British record is of a bird obtained at Penzance.

In the above brief notes, the description remarks refer only to male birds in summer plumage, for in winter or in juvenile plumage most of the different races of yellow wagtail resemble each other so closely that much experience is needed to distinguish them.

RECENT DISCOVERY OF A DENE-HOLE AT GRAYS.

By PERCY THOMPSON, F.L.S.

(With One Illustration.)

TOWARDS the end of January, 1920, workmen in the employ of the Grays Chalk Quarries Co. accidentally broke into an underground pit during quarrying operations. By courtesy of the Directors of the Company, notice of the discovery was sent to the Club, and an invitation was extended to its Members to inspect the pit before it was filled in again.

Accordingly, on February 5th, a party, consisting of Miss G. Lister, Mr. W. Whitaker, Mr. E. T. Newton, Mr. S. Hazzledine Warren, Mr. F. J. Brand, and the writer, visited the large quarry belonging to the Grays Chalk Quarries Co., situated to the north-west of the town of Grays, and was conducted by

the Manager to the site of the new discovery, which is at the extreme northern end of the quarry.

At this point the Thanet Sand, with its capping of Pleistocene river-gravel, has been worked back in earlier years, and forms a vertical cliff some hundred feet behind the present face of the underlying Chalk, and upon the wide ledge so formed a line of rails for the quarry railroad is laid down.

Recently, it was desired to form a second line of rails close up to the cliff of Thanet Sand, and the latter was being slightly trimmed back to allow this to be done, when a cavity was broken into at the very base of the cliff, which proved, on further excavation, to be a dene-hole, similar to, but smaller than, those so well known at Hangman's Wood,¹ $1\frac{1}{2}$ mile to the east; the pit was found to extend, in part, under the cliff and, in part, beneath the ledge formed by the removal of Thanet Sand in past years.

This pit was an undoubted dene-hole, of the usual double trefoil in its plan (Fig. 1), its longer axis running from north-west to south-east.

The pit had been excavated by its constructors in such a way that the "Bull Head" Band of green-coated flints between the Chalk and Thanet Sand formed its actual ceiling, without any intervening chalk being left, as in the Hangman's Wood dene-holes, to form a substantial roof. Probably on this account, falls of flints and sand from the ceiling had taken place in two of the northern chambers (marked x x in the figure); and this fact, coupled with the presence of some threatening joints in the chalk of the end wall of the northern terminal chamber, had probably dissuaded the original constructors from proceeding further with their excavations, and this accounts for the unusually small size of this terminal recess.

The floor of the dene-hole was approximately 44 feet below the original surface of the ground, and the shaft, some $2\frac{1}{2}$ feet in diameter, was in the roof of the short, central connecting corridor between the two trefoil ends of the pit, but is now choked with a heterogeneous mass of fallen gravel from above. No grooves worn by ropes could be detected at the lower end of the plugged shaft, but three foot-holes were seen in the chalk walls below the shaft, two of these being in the eastern wall, one

¹See "Essex Naturalist," 1, 1887, pp. 225-276.

above the other, the third in the western wall ; these foot-holes were flat-bottomed, and about $8\frac{1}{2}$ inches wide.

The total length of this dene-hole, from north-west to south-east, was about 25 feet, and the height of the several chambers about 10 feet in each case. The depth of the recesses was about 10 to 11 feet and the width 5 to $5\frac{1}{2}$ feet, except in the case of the shallow northern terminal chamber, which was only 6 feet in depth, for reasons already suggested.

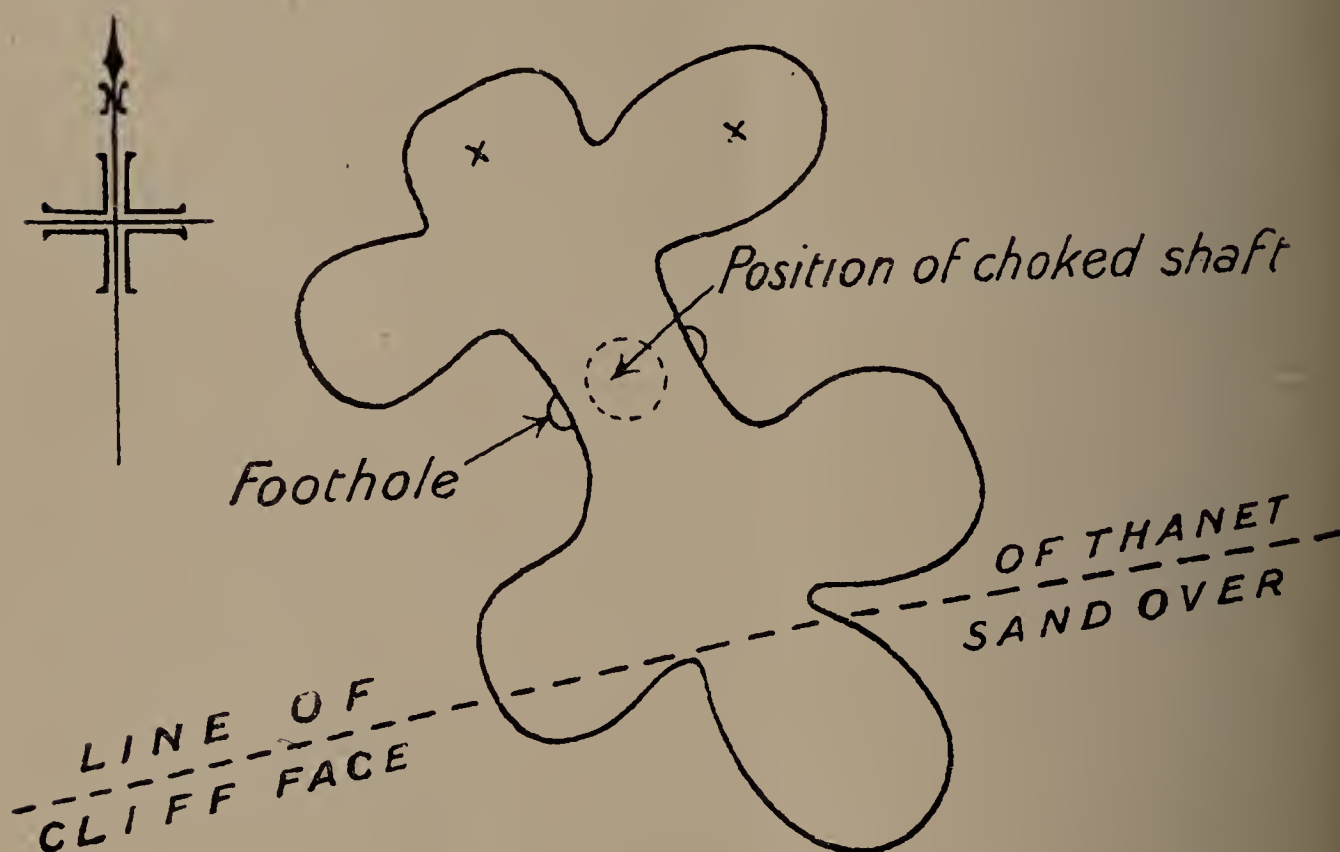


FIG. I.

PLAN OF DENE-HOLE.

The visitors were shown a letter S and a date, said to be 1220, scratched upon the chalk wall of the south-eastern terminal chamber (in a curiously convenient position !), and the workmen asserted that this inscription had certainly not been done since the discovery of the pit. The writer was, however, sufficiently sceptical to examine the scratched numerals minutely with a pocket-lens, when not only could the absolute freshness of the white scratchings in the very slightly stained face of the chalk be detected, but also the apocryphal 1220 could be deciphered as being in reality 1920 ! It is worth putting this on record at

once, as probably a tradition of a dene-hole actually dated 1220 will be in vogue in the Grays neighbourhood for years to come, and will be accepted as an article of faith by all good local patriots.

The workmen stated that no relics or bones were found in the pit when broken into; by the time the visitors inspected it the chalk floor had been covered up by the commencement of the process of filling in the hole.

The present is not the first dene-hole which has been discovered in this quarry. We were informed that, some ten or twelve years ago, another similar pit was met with, at a point over 100 feet to the south, and was destroyed by the quarrying operations. It is more than probable that others exist further to the north, and that these will be met with as the face of the chalk is cut back during future years.

ON CONIFERS GROWN IN SUBURBAN GARDENS.

(Being a Presidential Address delivered to the Club at the Annual Meeting on 27th March, 1920.)

BY GULIELMA LISTER, F.L.S.

(With Two Plates.)

THOSE who live near London and take an interest in their own gardens may often be heard to express the view that they detest conifers; and when we see, as we do only too often, an *Araucaria* or "Monkey-Puzzle" planted in the front court of a small garden, yearly blocking out more light from the house-windows and becoming more unsightly as it struggles with adverse circumstances,—cramped space and London smoke, or groups of lean and dingy Lawson's Cypress filling places where light and air should be let in, and which might be made gay with flower borders, we may well understand the wishes of those who would like to do away with these unfortunates and have more suitable plants.

But there is another side to the matter. It is the people who have put these conifers in the wrong place who are to be blamed, not the conifers. When the same plants are seen growing to advantage, best of all in their native countries, we regard them with entirely different feelings.

Take, for example, our three British conifers, Yew, Juniper, and Scotch Fir. The old yews that form dark fringes along the brows of the chalk hills in Surrey, and in the Thames valley, or are scattered on the sides of deep combes, seem as much in their right places as does the true deadly nightshade, which often grows below them, or as all the array of bright chalk flowers, rock-rose, wild thyme, squinancy-wort, and a host of others decking the sunny turf beyond. The venerable churchyard yews, although planted by man, have a dignity of their own and a charm of association. Some learned people tell us that these churchyard yews (or rather their predecessors) are survivals of the ancient groves which the Druids used to plant round their sacred spots, and the idea has much to commend it to our minds; others say that yews were given the sanctuary of the churchyard in order that enough of their tough and elastic timber might be available to supply the long bows for which our English archers were famed. The derivation of yeoman from "yew-man" is, perhaps, unjustifiable, but certain it is that yew-wood was so prized in England that its exportation used to be forbidden by law.

Juniper, like yew, is at home on chalk and limestone soils, and thrives on slopes where it is exposed to strong light. The artist might, perhaps, criticize a juniper-besprinkled hillside as having a "spotty" appearance, but when one is close among the plants their beauty and variety seems to grow. Some bushes are low and compact, others are tall, slender and feathery, while the deep green colour of their foliage is veiled with a bloom of glaucous-blue, or is replaced in young shoots by rosy-lilac. The varied growth does not appear to be associated with the fact of the plant being either stamen-bearing or berry-bearing, but the tallest junipers grow on the steepest slopes.

For our third native conifer, the "Scotch-Fir" or Scots pine no championship is needful, for we all know the charm of a pine-crowned hill, or of a pine-wood, with the music of the wind in the tree tops, and its varied undergrowth. The Scotch-fir is

a light-demanding tree ; when growing close, the trees soon lose their lower boughs, and between their crowns sufficient light passes down to admit an undergrowth of brambles, bracken or bluebells ; in Scotland, where only in the British Isles the tree is now truly native, the pines form majestic forests, while beneath them grow beds of deep moss, with bilberry, cowberry, and bearberry bushes.

The taste for growing foreign conifers in our gardens is a comparatively modern one. As late as the end of the 18th century, few kinds were cultivated in England. William Aiton, one of the three able men who helped the Dowager Princess Augusta to lay out the new Botanic Gardens at Kew, gave an account of the 5,600 foreign plants introduced into England up to the year 1789 ; only 37 of these were conifers.

In the list of conifers grown at Kew in 1903, 246 species and 451 varieties are enumerated, to which a number more have been added during the succeeding seventeen years, forming the present magnificent collection there. The taste for planting conifers in private gardens seems to have sprung up about ninety years ago, and soon increased so much that it became the fashion for the gentry who took a proper pride in their garden to set apart a special portion for a " pinetum," in which many species of coniferous trees were planted. Collectors in various parts of the world, especially in North America, were exploring fresh districts, and sent home seeds of new conifers, which were distributed among those who knew best how to rear young plants ; hence it comes about that we have inherited many *pineta*, where numbers of these trees have now grown to a stately size, fully justifying the hopes of those who planted them. The fashion for *pineta* waned somewhat as time went on, but it has revived of late years as the result, partly of many fresh species of conifer having been recently discovered in China and elsewhere, and partly from the desire to improve the very unsatisfactory position of forestry in the British Isles.

Probably the nurseryman's habit of using such trees as " Monkey Puzzles " and Lawson's Cypress, in laying out series of small gardens along new roads, dates from the middle of the last century, when the growing of conifers was generally popular, but it is now fast dying out, and with the increasing practice of the owner's cultivating his or her own garden, a more appropriate selection of plants is made.

Much interest, however, may be found in these often abused suburban conifers when we get to know more about them and can picture them, at least in imagination, in their native haunts. I have made a list of those I have seen in the gardens of Leytonstone, Wanstead, Woodford, and Chingford, as far as I could make them out from the road, and find they number twenty-seven species. Probably this list is far from complete, and I should be grateful to anyone who would help me to add to it. Considering that conifers demand pure air, if they are to thrive, I think our district has not done badly.

But it may well be asked "what is a conifer?"

Conifers belong to the division of seed-bearing plants, called *Gymnosperms* (from the Greek *gymnos* naked, *sperma* seed) or plants with naked ovules, as contrasted with the true flowering plants or *Angiosperms* (Greek *aggios* a little box, *sperma* seed), in which the ovules are in a closed box, or ovary, the result being that in *Gymnosperms* the pollen grains are carried by the wind direct to the ovules, and in *Angiosperms* they can only reach the ovules by penetrating the stigma of the ovary.

Gymnosperms have an extremely ancient ancestry, dating back as far as the Carboniferous formation.

Modern *Gymnosperms* are divided into four great classes:—*Cycads*, *Gnetales*, *Ginkgoales* and *Conifers*.

The *Cycads*, which in a past geological period formed one of the most important groups of plants on the land surface of the earth, are now reduced to a few genera and species growing chiefly in the southern hemisphere. They are mostly short, stout-stemmed plants, with very large fern-like leaves, and with large terminal cones of either male or female flowers. None of them are capable of growing out of doors in English gardens, and so, although from the point of view of relationship they are extremely interesting, we need not refer to them further here.

The *Gnetales* are a still smaller group of curious plants, containing three genera, which differ much in appearance from each other and from other *Gymnosperms*; in some respects they show affinities with true flowering plants.

The *Ginkgoales* contain a single genus and species, *Ginkgo biloba*, the Maidenhair tree. Until recently the tree was regarded as a conifer, and this is my excuse for speaking of it.



MAIDENHAIR TREE (*Ginkgo biloba*)
in Garden at George Lane, Woodford.

here. When well grown it is a pyramidal tree, with a tall straight trunk and many spreading branches bearing in summer long and short shoots, and having leaves shaped like those of maiden-hair fern. The male flowers are in loose catkins, bearing a number of stamens on short slender stalks ; the female flowers, formed on another tree, consist of a long peduncle bearing two ovules at its summit, each surrounded by a collar-like base. When ripe the fruit is like a big yellow cherry, having a fleshy outer coat surrounding a woody shell enclosing the seed. A remarkable archaic character retained by *Ginkgo* is that the ovules are fertilized by active ciliated spermatozoids, as they are in Cycads and ferns, and not by merely passive nuclei conveyed by the pollen tube, as in conifers and flowering plants. Remains of fossil plants closely allied to *Ginkgo* have been found in Britain and in many parts of the world, but at the present time this "living fossil," as Darwin called it, is "reported to be wild sometimes in China," but otherwise is known only in gardens. The male plant only has been introduced into England.¹ A well-shaped tree, about forty feet high, said to be the finest in the neighbourhood of London, is to be seen in a garden, formerly belonging to the Mackerzie family, in George Lane, Woodford. It bears abundant stamen-flowers in early summer. (Plate X.)

The true conifers form by far the largest class of living Gymnosperms. They abound in many parts of the world, especially in temperate, subtropical and mountain regions, where they often form dense forests.

As their name implies, their flowers are usually arranged in cones, which are either male or female. They are never borne at the apex of the stem, as in the Cycads. The male flowers consist of a number of stamens, each with two or more pollen-sacs and arranged on a common stalk to form a cone or catkin. The female flowers usually form cones, but there are many exceptions, as in the large group to which the yew belongs.

The true meaning or morphology of the different parts of the flowers is still a matter on which no final decision has been reached by botanists. For our present purpose we may take

¹—Since writing the above, my attention has been drawn to the fact that nine years ago, in 1911, a shoot from a female *Ginkgo*, growing in the botanic gardens of Montpellier, in the south of France, was grafted on to the fine old male *Ginkgo*, in Kew Gardens. Last autumn, when the leaves were shed, it was seen that several fruits had been borne on the graft. After this successful experiment it may be hoped that ere many years have passed *Ginkgo* fruits will be met with in many other British gardens.

Araucaria as a simple case ; its great cone consists of a large number of spirally arranged bracts or carpels, differing little from the foliage-leaves, and each bract bears a large ovule closely adhering to its upper surface. As Prof. Seward points out, the arrangement recalls that seen in *Lycopodium* or Club Moss in which the fertile leaves also bear sporangia on their upper surface.

In the large group to which the Pines belong, the bracts of the female cone are quite unlike the needle-like foliage leaves, and more nearly resemble the bud-scales, which, however, are only modified leaves. They are small and have at their base on the upper surface a large scale bearing two ovules. In a young cone the bracts can easily be seen ; but in a mature cone the ovule-bearing scales have grown to be so much larger and stouter that it is only by pulling the cone to pieces that the minute stunted bracts can be made out. Cedars, larches, spruces, and silver-firs all have cones, of much the same type, and spirally arranged leaves.

In the giant *Sequoias*, and the Deciduous-Cypress, *Taxodium*, the ovuliferous scale is inconspicuous and closely united with the bract. In the cypresses, *Arbor-Vitæ* and junipers, no ovuliferous scale is present in the female cone, and the bracts and also the leaves are either opposite or arranged in whorls.

The yew is the only representative commonly grown in gardens of the large family of conifers, the *Taxaceae*, in which cone-formation is imperfect in the female flower, with the carpels reduced to few, or, in yew, to one, and bearing only one or two ovules. When ripe the seed is usually more or less enveloped by a fleshy outer coat, familiar in the sweet-tasting rosy cup of the yew berry.

In habit the conifers are *xerophytes*, that is, they are adapted to dry ground. In warm regions they thrive best in light sandy soils. In cold climates the ground in winter is physiologically dry, since the roots are unable to absorb very cold water. To guard against undue evaporation, the leaves have a comparatively small surface, the epidermis covering them is strongly cuticularized, and the stomata are often deeply sunk. It is possible that no true leaf-blades are formed either in conifers or even in *Ginkgo*, and that what we see is a leaf-stalk doing duty for a leaf, as is probably the case also in Monocotyledons.

The structure of the wood of conifers is simple, since there are no vessels, or continuous tubes for conveying water, as in true flowering plants, but it consists of cells, tracheides, whose walls are marked with the characteristic "bordered pits"; these pits may be compared to little round windows, with thin window-panes permeable to water, protected on both inner and outer sides by deeply projecting circular frames. To quote from Dr. Scott's "Structural Botany":—"We must remember that the tracheides are closed cells, so that no communication is possible between them, except through their pits. The whole of the water which goes up a fir tree has to pass through the bordered pits thousands of times on its journey from the roots to the leaves. The structure of the wood is not an adaptation to external conditions, but is an inherited or phyletic character." It is clear therefore, that apart from climate, coniferous trees are unable from their structure to allow a rapid flow of water through the wood.

After this short general sketch of conifers, we may now consider some of the species growing in our district.

Araucaria imbricata, the "monkey puzzle," occurs in many gardens, always suffering from the deposit left by smoke on its leaves; the finest tree near is about thirty feet high. In its native land, high on the Andes of the Argentine and Chili, it is a noble tree, forming vast forests, with tall, bare stems, and dense crowns of foliage, and attaining a height of 150 feet, and a girth of 18 feet. Prof. Seward, in his "Fossil Plants," writes:—"There are few existing trees comparable with these venerable types in the impression they produce of the lapse of ages, and the vicissitudes of a dwindled race." For long ago, in the Jurassic period of geological time, this ancient family of *Araucarias*, which is now only scattered through parts of the southern hemisphere, was widely represented in both hemispheres, and was well represented in English woodlands. It is probable that the jet for which Whitby is famed was to some extent formed from Araucarian wood. The name is derived from the Araucarians, a tribe of South American Indians, who pride themselves on their name, for it means "frank" or "free." To them the tree is a friend, for they use its hard durable wood, they eat its nuts, either raw or cooked, and from them they distil a spirit, which, in their inclement climate, may make a welcome alternative to water on festive occasions.

Araucaria excelsa, the Norfolk Island pine, should scarcely be mentioned here, for it is not hardy enough for gardens: it is, however, so familiar as a pot plant in parlours that I have ventured to introduce it in connection with its near relation, the monkey puzzle. From the latter it differs in its more slender foliage and fernlike branches; but this spreading foliage is the juvenile type only; when mature the leaves are stiff and scale-like, and curve closely upwards. This also forms a handsome tree, from 150 to 230 feet high, with a girth of thirty feet, in its home in Norfolk Island, far to the east of Australia.

The genus *Abies*, the silver-firs, includes a large number of beautiful trees, only three of which I have seen in gardens near London.

The silver-firs are characterized by their scattered needle-like leaves, which are flattened and usually waxy beneath and traversed by two resin canals; the cones are erect, and when mature their scales fall away from the persistent axis.

Abies pectinata, the common European silver-fir, and *A. Nordmanniana* from the Caucasus, both grow in a few gardens in Wanstead and South Woodford. Young plants look healthy, but they soon dwindle in our smoky air. They are closely allied to each other, but the European silver-fir has its foliage arranged usually as in a yew, or like a double comb, while in the Caucasian species it is arranged like a brush. They both form extensive forests on their native mountains. In England, Nordmann's silver-fir is the hardier species and less liable to disease than *Abies pectinata*.

The third species of *Abies* that I know of near here is *A. pinsapo*, the Spanish silver-fir, distinguished from its allies by having the stiff leaves standing out all round the branches with a bottle-brush effect. Its home is on the high mountains in the South of Spain, where, exposed to great heat and cold, it forms forests close to the snow-line. A healthy tree grows in a garden, north of Chingford.

The Douglas fir or spruce, *Pseudotsuga Douglasii*, may be seen as a small spreading tree about eighteen feet high in a Woodford garden. It resembles some of the silver-firs in foliage, but has drooping, not erect, cones, which at length fall off entire. The three pronged carpels or bracts project far beyond the ovuliferous scales. Even without the cones the Douglas

fir may always be recognised by its slender, pointed, bright brown leaf buds. Its native land is the Rocky Mountains from British Columbia south to Mexico, a region favoured by many noble species of conifer. When I visited the city of Vancouver, in 1897, the great saw-mills there were working day and night, cutting up logs of Douglas fir. Outside the mills was a huge pile of smouldering saw-dust, which, I was told, had been burning for thirteen years, while overhead hung always a pall of smoke from the forest fires made to clear the land for farming and building purposes. Such reckless waste of a priceless inheritance has, I believe, been checked of late years, and plans for reafforestation are being adopted. Douglas firs vary in height from low dense bushes in high exposed situations to lofty giants of over 200 feet in the lower valleys.

Of the large genus *Picea*, the Spruces, we have but one species commonly grown in our gardens and plantations, *P. excelsa*, the European Spruce, not now a wild British tree, but in preglacial times a native of East Anglia, as is proved by the characteristic cones that have been found there. This is the "Christmas Tree" of our childhood's delight. Spruces are distinguished from Silver Firs by their drooping cones, which fall away as a whole, and by the very prominent leaf-bases which roughen the branches after the leaves have fallen. The Common Spruce, unlike the Silver firs, is a shade-enduring tree; when thickly planted the lower boughs do not die, and the leaves remain on the branches from eight to thirteen years.

Pinus, the Pines, forms by far the largest genus of conifers. It is well represented all round the northern hemisphere, and a few species occur in the south also. Except in the youngest seedlings the long needle-leaves are not scattered singly, as in the previous genera, but are borne in groups of either two, three or five, on very short side shoots, which eventually fall off as a whole. The Scotch Fir, *Pinus sylvestris*, has needles in pairs, as has the Corsican Pine, *P. Laricio*, and its varieties, the Austrian and Pyrenean pines, all of which are not unfrequent in our gardens—their much longer needles and the pyramidal shape of the trees distinguish them from the Scotch Fir. Two other pines often grown in this neighbourhood, *Pinus Strobus*, and *P. excelsa*, both have needles in clusters of five. *P. Strobus*, the Weymouth pine, or White Pine of Eastern Canada and New England, has

slender drooping cones, and elegant arching foliage. It is said that the needles change their position according to the weather or the season. On a warm summer day the leaves will be fully separated ; in wet weather and in winter they are more parallel and drooping. The shorter needles and downy young shoots distinguish the Weymouth Pine from *Pinus excelsa*, the Bhotan Pine, a noble tree from the Himalayas.

The Cedar of Lebanon, the Deodar and the Atlantic Cedar are probably only local forms of one species. As in the pines, the needles are arranged on both long and short shoots, or "spurs" as gardeners call them ; the latter are stout and persistent, and the needles fall off separately.

Cedrus Libani is found wild only on the arid slopes of the Lebanon and Taurus mountains. It is said that no young trees are growing up, so that these ancient and gnarled giants will eventually disappear from their native land, and Cedars of Lebanon will be found only in gardens. When grown crowded in groups, the trunks are tall and erect as in the Deodar. Cedars were first introduced into England in the reign of Charles II, when in 1670 the Enfield cedar was planted. Seven-year old seedlings from this tree were planted on the lawns at Bayfordbury, near Hertford, in 1765, and at least seven of them are fine old trees at the present time. Careful measurements have been taken periodically since 1822, which prove that one, the largest, has probably doubled in girth during the last hundred years. In 1822, the girth at five feet was 14 feet, 5 inches ; in 1904 it was 27 feet, 3 inches. Almost all the old gardens in our neighbourhood had cedars, some of which still survive, and are probably over 100 years old, but are struggling on with thick deposits of London smoke. Plate XI. is from a photograph taken about 1858 of a fine Cedar in my grandfather's garden at Upton House.

Cedrus Deodara, the Tree of God, as its Hindustani name "Devadara" means, flourishes in the Himalayas from an altitude of 5,000 to 10,000 feet, attaining perfection where for half the year its boughs are covered with snow. It there attains a height of from 150 to 200 feet, and a girth sometimes of 30 feet. The seasoned timber of the Deodar is the finest of its class in the world, and is never attacked by insects. Cedar wood and its resin, cedar-oil, have had a well deserved fame for thousands of years. The *Deodar* has great powers of reproduction,



CEDAR OF LEBANON (*Cedrus Libani*)
in Garden of Upton House
(From a photograph taken about 1858).

and when the leading shoot is injured its branches often show a tendency to form straight upright shoots ; “ if only a small branch is left on a felled stump, numerous shoots grow up, which almost have the appearance of coppice shoots ” (Brandis, “ Forest Flora of N.W. and C. India ”). Many beautiful young Deodars are grown in suburban gardens. One on our lawn at Leytonstone, sketched by my father in 1865, is probably 70 years old and is now about 50 feet high.

Cedrus atlantica, from the Atlas mountains in North Africa, with its silvery foliage, I have not noticed in this neighbourhood.

The northern genus *Larix* is closely allied to *Cedrus*, but has deciduous leaves ; in other words, it has solved the problem of checking undue evaporation in the cold season by shedding all its leaves in autumn and pushing forth a glorious garment of fresh emerald green foliage in spring. The cones, instead of taking two or three years to mature, as in the Cedars, ripen in one year, although they remain on the branches for a much longer time. The “ rosy plumelets,” as the female cones of the European larch have been aptly called, appear on the same branchlets as do the cushion-shaped male flowers, and may be seen abundantly near Wanstead Park and elsewhere in our neighbourhood in spring-time. Larches thrive in comparatively poor land ; the wood is far more durable than that of Scotch-fir for all outside work.

The Mammoth Tree, *Sequoia gigantea*, and the Red-wood, *S. sempervirens*, both now confined to a small area in California, are the only survivors of a genus that once probably extended throughout the North Temperate region. Undoubted remains of *Sequoia* have been found in Lower Cretaceous beds, in the Tertiary beds at Bournemouth, in the Isle of Wight, and in Antrim ; while, in the Bovey Tracey beds, well preserved stems and cones have been found associated with fragments of a vine, of *Magnolia*, and of the Swamp Cypress, *Taxodium*, now growing only in the southern United States. Remains of *Sequoia* have also been found in Greenland and Spitzbergen, showing (as Prof. Seward points out) “ the existence in these ice-covered lands of plants which clearly denote a mild climate.” Both of the Californian *Sequoias* were introduced into England about the middle of the last century, and have been much cultivated.

Several trees are to be seen in Woodford and Snaresbrook gardens, where one of the Red-woods is about 40 feet high.

Sequoias have cones with shield-shaped bracts, each bearing many ovules. *S. gigantea* has stiff, pointed, scale-like foliage, while *S. sempervirens* has foliage like the Yew. In both species, the red-brown felt-like bark is very thick. To give an idea of the stupendous size the Mammoth Trees attain, figures seem to convey but an imperfect impression. One of the trees felled in the Yosemite Valley had a girth of 93 feet near the base, a height of 363 feet, and the bark was a foot and a half thick ; the age, calculated by the number of annual rings, was over 3,000 years.

Taxodium distichum, the Swamp, Bald or Deciduous Cypress, is remarkable amongst conifers in shedding its leaf-shoots every year. The bright-green feathery foliage appears about the beginning of May. The ripe cone is about the size of a pigeon's egg, and consists of hard shield-shaped bracts, each bearing two seeds. When growing in wet ground, curious hollow knee-like branches grow up from the roots, which are thought to have an aerating function. The Bald Cypress inhabits swampy land in the Southern States of North America, where it is a large and valuable tree. Mention has already been made of its remains having been found in the Bovey Tracey beds, associated with Sequoia. It has long been cultivated in England, having been introduced in the time of Charles I. It may be seen in several gardens in this neighbourhood ; one tree at Snaresbrook is especially well grown and is about 50 feet high.

We now come to the Cypress group, many species of which are not easy to distinguish without their cones.

Libocedrus decurrens (syn. *Thuya gigantea* Nutt.), the Incense Cedar, is a noble tree in its home in the Sierra Nevada ("Snowy Mountains") of California. Old trees have a straight trunk from 40 to 140 feet high, crowned with an umbrella-shaped top. The pointed compressed scale-like foliage is arranged in four rows, in two opposite pairs, two median, two marginal ; but the pairs are so nearly on a level as almost to form a whorl of four, which gives a jointed aspect to the stiff ascending branchlets. Cones are very rarely produced in England. A small tree about 18 feet high grows in a Snaresbrook garden.

The genus *Thuya*, or Arbor-Vitæ, differs from *Libocedrus*

in the cones being composed of a greater number of bracts. *T. orientalis*, the Chinese Arbor-Vitæ, a low tree or shrub, abounds on rocky hills in China and Japan ; the erect branches and rather dull-green close foliage give it a characteristic aspect. A weathered and rather ragged tree in our garden at Leytonstone must be at least 80 years old, but the young compact forms, with a yellow-green variety of foliage, are more ornamental and deservedly popular, and are not unfrequent in gardens in our neighbourhood. *Thuya plicata* Lamb. (syn. *T. gigantea* Hooker. *T. Lobbii* Hort.), the Western White Cedar, is one of the finest trees of Western America, both as regards height and girth, It extends from British Columbia as far north as Alaska, and may attain the height of 150 feet. It is by far the most beautiful tree of the genus, with graceful drooping tips to the fern-like branches and deep green shining resinous foliage. It grows in several of our suburban gardens, but needs purer air for complete success.

The Cypresses are distinguished by their shield-shaped conescales, those of *Thuya* and *Libocedrus* being oblong.

Cupressus Lawsoniana, Lawson's Cypress, is a handsome tree, in aspect resembling *Thuya plicata*. It is a native of Northern California, where along the banks of streams it grows to the height of 100 feet. It is a hardy plant and may be seen in one form or other of its many varieties, either compact or glaucous or erect, in most gardens and churchyards. In spring the bright red anthers of the stamen-cones have a showy effect against the dark foliage.

C. Nutkaensis, the Yellow Cypress, is another handsome tree ; it is like *C. Lawsoniana*, but has more strikingly drooping branchlets, and keeled rank-smelling leaves. The smooth round cones, with few shield-like bracts, each with a central spine, are also characteristic. It grows along the coast of British Columbia, and on Vancouver Island. I noticed it as a vigorous shrub in a garden on Leppits Hill, Chingford.

C. pisifera, the Pea-fruited Cypress, is a small tree from the Island of Nippon, Japan. The acute foliage is usually concave and glaucous beneath and has a feathery appearance. It is not unfrequent in gardens as a small shrub, usually with a spreading type of foliage. For, like most of the Cypresses, Arbor-Vitæs and Junipers, this species has in its youth linear spreading

leaves, and in maturity scale-like adpressed leaves. So different are the two types that for a number of years the juvenile foliage was thought to belong to a different genus and was given the name of *Retinospora*; cuttings taken from this stage never assume the mature type of foliage.

The junipers form the last genus, *Juniperus*, we have to consider. The fleshy berry-like fruit is formed by the union of bracts, which are at first free. Our English Juniper, *J. communis*, is seldom grown, but the Chinese species, *J. Chinensis*, is often cultivated and forms a bush or small tree. Both the juvenile and adult types of foliage are seen on the same plant, the former towards the base where the light is dim, and the closer scale leaves at the ends of the shoots where exposed to strong light. The male plants are more compact and pyramidal than the female.

I have attempted to give in this sketch merely the most striking characters that distinguish the genera and species from each other. I have not touched on the subject of the more intimate structure of the leaves, the stem and the cones, all of which seem to call for attention. But should anyone feel drawn to making even a cursory study of conifers, I can assure them from my own experience that it is one of ever-increasing interest.

ON INSECTS SUCKING THE SAP OF TREES.

By CHARLES NICHOLSON, F.E.S.

(Read 29th November, 1919.)

ON the occasion of the Club's meeting on 30th Nov., 1918, when Mr. Miller Christy read some notes on the above subject—subsequently printed in this volume (pp. 10-12)—I expressed a wish to inspect the tree to which his notes referred, and, at his invitation, I paid a visit to his garden at Chignal St. James, on the 23rd August, 1919.

The day was dull and not over warm, but occasionally brightened with short bursts of sunshine. On arriving at the tree in the afternoon, I found a good number of wasps scattered up and down the main trunk of the tree, from near the ground to a height of at least 50 or 60 ft., and also along a long limb, which extended almost horizontally towards the S.E. Most of the wasps (all of which appeared to be workers of *Vespa germanica*),

had their heads more or less deeply inserted in cracks in the bark. In several cases, there were bunches of from 7 to 10, all apparently busily engaged in sucking the exuding sap, which seemed to be entirely confined to those deep cracks, and did not spread over the surface of the bark in any part, so far as could be seen. On breaking off small bits of bark on the edge of a crack, the bottom of the crack was seen to be obviously darker in colour, due to a slight exudation of moisture (sap), which, itself, was also noticeable. Besides the wasps on the trunk, others could be seen flying round the trunk and the limb referred to, and but for the unfavourable weather, there would probably have been more of them. A noteworthy fact was that, contrary to Mr. Christy's previous experience, he had seen no hornets on the tree this year, although several large ones (possibly "queens") had been destroyed in the house; and I subsequently took a small nest, with about a dozen workers and brood, but no queen, from one of the nesting-boxes for birds which Mr. Christy had put up in the adjacent wood.

The number of wasps on the tree gradually increased during succeeding weeks, until Mr. Christy was able to report hundreds of them sucking or flying round; but still no hornets appeared. Flies, however, were noticed, and, after dark on one evening, some moths of several kinds. One of these, which he sent me, proved to be *Noctua xanthographa*, an abundant species in late summer and a very common visitor to the entomologist's sugar patches.

On the 21st September, Mr. Christy reported that the whole visitation of sucking insects seemed practically over.

Short of felling or otherwise injuring the tree, I see at present no feasible way of solving the riddle of the phenomenon in this particular case. It is to be hoped, however, that the publicity given to the subject in the *ESSEX NATURALIST* may lead to the investigation of other similar occurrences, and publication of the results in its pages.

Albino Blackbird.—A blackbird, which exhibited uniform pale-cinnamon colouration frequented the gardens of the Uplands Estate, Loughton, for several weeks during the spring of 1919, consorting with normally coloured cock blackbirds.

PERCY THOMPSON.

NOTES ON A HORNET'S NEST FROM CHIGNAL ST. JAMES.

By CHARLES NICHOLSON, F.E.S.

(Read 29th November, 1919.)

MR. Christy mentioned hornet's nests, as occurring in the nesting-boxes in his wood and this was an additional inducement to me to pay him a visit, as I had not so far met with one.

On tapping each nesting-box with a long stick, no tell-tale humming was elicited from any of the boxes, but in one case a hornet quickly appeared at the entrance-hole, and, after a good look round, and some gnashing of its jaws, retired within the box. With the aid of a small step-ladder, I managed to reach the box and carefully and quietly removed the loose front, during which proceeding the aforesaid hornet again appeared, made a similar demonstration, and finally took wing without attempting to molest me. Whilst it was out I saw there was a small nest attached to the roof of the box, with some dozen hornets clustered on it and moving about somewhat nervously. I therefore replaced the front, plugged the hole, and proceeded to detach the box from the tree, to which it was secured with iron hinges and long nails. Whilst I was so engaged the sentinel hornet returned, and after flying round suspiciously, went into the box, from which I had removed the plug to allow it to enter. The box was then soon secured intact, and eventually taken home.

The next day being Sunday I was able to give further attention to my guests (all of which turned out to be workers), and found that during the night two of them had succumbed—probably to starvation—and were lying at the bottom of the box on the remains of the bird's nest, the latter being alive with fly maggots which had already commenced work on the two dead hornets. I therefore removed the living hornets into another box, where they enjoyed a good feed of honey, and some took a few turns round the room, their hum when on the wing being very rich and deep. Meanwhile the nest-box was thoroughly cleaned out and then they were again installed, one unfortunately getting away to the garden during the process. I subsequently noticed two or three others obviously on their last legs, and, as their

queen was missing, and they did not appear to have sufficient interest in life to feed themselves or the brood in the cells, I decided to kill them for my collection, and six of them are exhibited with the nest this afternoon.

It will be seen that the comb is about the size of half a cricket ball and the outer envelope has been commenced. There are 70 cells or parts thereof—all workers'—each cell being one-third of an inch in diameter at the mouth, thus contrasting well with the worker-cells of wasps and honey-bees, which measure about one-fifth of an inch. All the cells in the central part of the comb contained grubs, some of which were well-grown, and as none of the cells had the appearance of having been capped the existing workers had evidently removed the cappings and reduced the depth of the cells from which hornets had emerged to make room for fresh brood, none of the cells being deep enough to accommodate a fully developed pupa. As hornets take about 27 days to come to maturity, 10 of which are spent in the pupa stage, it seems that the queen in this case could not have been missing more than a week, as the youngest grubs appeared to be about two days old and the oldest about six. I must, however, confess that the history of the little nest is rather obscure, and I am not sufficiently acquainted with the life-history of the hornet to fathom the mystery.

Peregrine Chasing a Heron.—An interesting recent addition to the Club's collections at Stratford consists of an exhibition case, representing, in a pictorial setting, a wild Peregrine Falcon (a female, or "Falcon"), pursuing a Heron. The birds, which are beautifully preserved, were observed flying over the marshes by Dagenham Lake and shot some sixty years ago (in 1860 or 1861), by Mr. James Gardner, senior, the well-known taxidermist of Oxford Street, and were set up by him; the pictorial case, designed to represent the actual scene witnessed, was made for, and exhibited at, the Great Exhibition of 1862. Mr. Gardner's grandson, Mr. J. J. Gardner, has now kindly presented these interesting Essex specimens to the Stratford Museum.

Peregrines were formerly trained to fly at Herons in this country, two hawks (a "cast"), being invariably used in the attack, out of deference to the Heron's long powerful bill, which is said sometimes to have won the victory for the quarry by transfixing the attacking hawk; but this sport has been discontinued for nearly a century past.

PERCY THOMPSON.

THE ESSEX FIELD CLUB.—REPORTS OF MEETINGS.

ORDINARY MEETING (507th MEETING).

SATURDAY, 25TH OCTOBER, 1919.

This Meeting was held at 3 o'clock on the above afternoon in the Physical Lecture Theatre of the Municipal Technical Institute, Romford Road, Stratford, the President, Miss G. Lister, F.L.S., in the chair.

The following ladies and gentleman were elected Members of the Club:—

Miss Mabel A. Greaves, of *Esmé, New Wanstead, E.11.*

Mrs. L. Millburn, of 62, *Herne Hill, S.E.24.*

Mr. Ronald Bain Calder, of "*Wyvis,*" *Seagry Road, Wanstead.*

Mr. Percy Thompson exhibited fronds of the Royal Fern (*Osmunda regalis*) which had been recently found by Mrs. Thompson in Epping Forest: the last recorded occurrence of this fern in the Forest was *ante* 1854, at Chingford. The present specimen (which has been placed in the Club's herbarium) was under a foot high, and showed no signs of having been introduced by human agency.

Mr. Thompson also exhibited an album of lichens, mosses and fungi, which had been collected by Richard Warner, the author of "*Plantæ Woodfordienses,*" in the neighbourhoods of Gloucester, Worcester, and the Forest of Dean. This album was presented to the Club in its early days (in 1880) by Sir Clarke Jervoise, Bart., and had been lost sight of until recently: it had now been repaired, and the contained specimens mounted in such a manner as to allow Warner's quaint manuscript records of their habitats to be readily examined.

Mr. Thompson further exhibited, and presented to the Museum, a left lower ramus of the jaw of an Ox, with one tooth *in situ*, and also a portion of a leg bone of an ox, both of which were covered with incrusting lichens and served to illustrate the rapid rate of growth of the latter.

Mr. Charles Nicholson, F.E.S., exhibited, and presented to the Museum, a feeding platform of the Long-tailed Field Mouse (*Mus sylvaticus*), which appeared to be based upon a deserted bird's nest.

Mr. Avery exhibited a series of Essex prints selected to illustrate the neighbourhoods of Walthamstow, Leyton and Woodford.

Votes of thanks were accorded to the several exhibitors and donors.

Mr. W. Whitaker, B.A., F.R.S., gave a Report of the Conference of Delegates at the British Association Meeting at Bournemouth in September, 1919.

The thanks of the Meeting were voted at Mr. Whitaker for his interesting report.

The President then called upon Mr. Percy Thompson, F.L.S., who read a paper "*On an annotated copy of Warner's "Plantæ Woodfordienses,"*" which was illustrated by lantern photographs and by a display of photographs and by books referred to in the paper.

In the course of the ensuing discussion, Professor Boulger, F.L.S., F.G.S., said that to him the paper had been one of great interest; some

five-and-thirty years ago he had paid a good deal of attention to the biographies of Warner and the Forsters, having been commissioned to prepare a new edition of the *Plantæ Woodfordienses*, which was, however, never published. There is a considerable amount of material available for their biographies. He had visited "Harts," where he was shown several water-colour drawings—the work, perhaps, of Warner's heiress, Kitty Warner—showing the garden as Warner made it. At Idsworth the late Sir Jervoise Jervoise had shown him portraits of Richard Warner, of his brother Robert and of Bishop Burnet, the godfather of their eldest brother John; but, alas, damp had removed the labels of the two former portraits, and no one now knew which old gentleman in short wig and flowery waistcoat was the Woodford botanist. The Warners held property in Clerkenwell, where their name is still attached to a street. In 1730 Richard, then seventeen, entered Wadham College, Oxford, to which at his death he bequeathed many of his books and collections. In 1748 Warner received a visit at "Harts" from Peter Kalm, the pupil of Linnæus; though all the English portion of Kalm's travels was omitted from the English translation by John Reinhold Forster, and thus remained unpublished here until Mr. Joseph Lucas's book appeared in 1892. It is interesting to remember that Warner took Kalm to see Peter Collinson's garden at Peckham and to visit Philip Miller and the aged Sir Hans Sloane at Chelsea, and that Linnæus himself would have named the Cape Jasmine that Warner first flowered after our local botanist, but for the latter modestly declining the honour, on which it became *Gardenia*. Though the *Plantæ Woodfordienses*, printed in 1771, is his best known work, Warner did a great deal of other literary work. He was long engaged in preparing a new edition of Shakespere, which he abandoned in favour of Steevens, and he left two manuscript glossaries of the poet, one in twenty octavo and the other in fifty-one quarto volumes, now in the British Museum. He also translated the larger part of Plautus for a revised edition and continuation of Bonnell Thornton's, which he published between 1769 and 1774.

The *Plantæ* originated in an annual herborization of the Apothecaries' Company on the Forest, when Warner was accustomed to entertain them and it is dedicated to the Court of Assistants of the Company. Though an interesting list, is it not free from blunders, and the *Additions* printed in 1784 far exceed those left in manuscript by Warner in his own copy, now at Wadham.

Of the Forster family we know many details from the *Recueil de manuscrits* and *Epistolarium Forsterianum* of that remarkable eccentric, Thomas Ignatius Maria Forster, son of Thomas Furly Forster. It would seem probable that each of the three brothers had a copy of the *Plantæ*, though Thomas's has not yet turned up. Edward's copy, now the property of Dr. Daydon Jackson, he exhibited on the table. It is interleaved, has Edward Forster's autograph dated 1784 on the fly-leaf, the *Additions* bound up with it, the Index of Latin names added in manuscript, together with a transcript of Warner's additions from the copy at Wadham which Thomas does not appear to have seen, and many manuscript notes in Edward's well-known handwriting, some of which are partial transcript of entries in Benjamin Forster's copy which Mr. Thompson exhibits to-day.

Though his brother Benjamin's notes and specimens are, no doubt, as

Mr. Thompson has shown, incorporated with his, there is abundant proof of much good work by Edward during the twenty years that followed Benjamin's death.

The MS. note by William Pamplin which Mr. Thompson has described is unquestionably by the late bookseller of Frith Street, Soho, as the speaker recognised both paper and handwriting as identical with notes sent to him, and the link now traced between Pamplin's family and the Forsters of Walthamstow was most interesting.

A vote of thanks was passed to the author of the paper.

CRYPTOGAMIC FORAY IN EPPING FOREST (508th MEETING).

SATURDAY, 15TH NOVEMBER, 1919.

Favoured by dry, sunny weather, albeit with a cold northerly wind, some 40 members and friends assembled at Theydon Bois station at 11-30 o'clock, and proceeded via, the Green, to the Forest. The route taken was by Epping Thicks and the neighbourhood of Ambresbury Banks, Long Running, the "Wake Arms," Verderer's Path, and Honey Lane Quarters to Highbeach. Collections of cryptogamic plants were made all along the route, under the supervision of the referees for the day, who were:—

For the Mosses and Hepatics .. Messrs. L. B. Hall, F.L.S., and
W. R. Sherrin, A.L.S.

For the Lichens Mr. R. Paulson, F.L.S.

For the Fungi and the Myxomycetes.. The President.

Notwithstanding the unusually dry season and low temperature, a fair number and variety of specimens were met with, and the "finds" included one or two rare and interesting discoveries.

At Highbeach, Mr. Hugh Main, F.E.S., gave a most interesting field-demonstration (non-botanical), by digging out an individual specimen of our British "Trap Door Spider" (*Atypus affinis*), with its silken home complete, from a sandy bank. This was appropriated for the Club's Museum.

Tea was taken at the Roserville Retreat, Highbeach, at 4.15 o'clock, following which, a Meeting of the Club was held, with the President (Miss G. Lister, F.L.S.) in the chair, when Mr. Charles Witwell, of 29, Park Road, Wanstead, was elected a Member.

The President referred sympathetically to the regretted absence, owing to illness, of one of our conductors, Miss Lorrain Smith, F.L.S., and then called upon each of the referees for a report on the finds of the day.

Mr. Hall reported that the yield of Mosses was exceptionally good, no fewer than 46 species having been met with during the Foray; while 13 hepatics had been identified. Mr. Hall gave a general account of the Bryophytes in their relation to the neighbouring groups—higher and lower—of cryptogams.

Mr. Sherrin reported that the two most interesting forms met with were *Sphagnum fimbriatum* and *Dicranum flagellare*.

Mr. Paulson reported that 17 forms of lichens had been identified during the ramble, and added an account of the algal cells in lichens and their peculiar mode of increase.

The President reported on the fungi and myxomycetes met with, and added some interesting remarks on the resting—or sclerotium—stage of the latter which supervened upon the advent of cold weather.

The Party then separated, making its way in small groups through the darkness to Loughton and Chingford stations *en route* for home.

ORDINARY MEETING (509th MEETING).

SATURDAY, 29TH NOVEMBER, 1919.

The second winter Meeting was held in the Physical Lecture Theatre of the Municipal Technical Institute, Romford Road, Stratford, at 3 o'clock, the President, Miss G. Lister, F.L.S., in the chair. 58 Members and friends were present.

Mrs. A. Williamson, of 15, *Drayton Road, Leytonstone, E.11.*, was elected a Member of the Club.

The Curator exhibited a collection of British Coleoptera arranged in eleven boxes, which had recently been presented to the Club's Museum.

Mr. Mothersole exhibited a fine flint arrow-head with two barbs, which he had picked up near Chelmsford.

Mr. Avery exhibited a selection of 55 old prints and views of Waltham Abbey from his collection.

Mr. D. J. Scourfield, F.Z.S., exhibited living specimens of the Fairy Shrimp, *Chirocephalus diaphanus*, from Berkhamstead.

Thanks were voted to the several exhibitors.

Mr. F. J. Brand reported on the Annual Congress of the South-Eastern Union of Scientific Societies, held in London in June, 1919, which he had attended as Delegate of the Club; the thanks of the Meeting were accorded to Mr. Brand for his report.

Mr. C. Nicholson, F.E.S., read a short paper entitled "Further Notes on Wasps sucking the Sap of Elms; and Notes on a Hornet's Nest from a Nesting Box for Birds," (see *ante*, p. 171). Thanks were voted to the author.

Miss A. Hibbert-Ware, F.L.S., gave a Lecture on "Field-notes on some Birds of Epping Forest," illustrating same by lantern photographs, and by an exhibition of skins and set-up specimens of birds, and by some pellets and gizzard-contents of the Little Owl.

Messrs. Miller Christy, Ross and Thompson contributed to the ensuing discussion, and a hearty vote of thanks was passed to the Lecturer.

ORDINARY MEETING (510th MEETING).

SATURDAY, 31ST JANUARY, 1920.

This (the third) winter Meeting was held, as usual, in the Municipal Technical Institute, Stratford, at 3 o'clock, the President, Miss G. Lister, F.L.S., in the chair. The attendance was 57.

The following persons were elected Members of the Club:—

Mrs. Charles Whitwell, of 29, *Park Road, Wanstead, E.12.*

Miss Annie Richardson Grove, of 30, *Lithos Road, Hampstead, N W.3.*

The Rev. M. W. Manthorp, of 8, *Empress Avenue, South Wanstead, E.12.*

Mr. John Avery exhibited a fine series of old prints and water-colour drawings of Barking, some 50 in all, from his own collection.

Miss G. Lister, F.L.S., exhibited a series of skins of Wagtails of various species and races, together with some water-colour sketches and maps to illustrate the geographical distribution of the various races.

Mr. Clifford Hart exhibited a set of eleven paintings on silk of various Birds.

Mr. Percy Thompson exhibited the British "Trap-door Spider," *Atypus affinis*, and its silken tube, found at Highbeach at the Club's cryptogamic foray in the previous November, which specimens had been prepared for exhibition in the Museum: Mr. Hugh Main, F.E.S., added some remarks on the exhibit.

Thanks were accorded to the various exhibitors.

The Curator appealed to Members for gifts of prints, drawings, or photographs to enrich the Club's Pictorial Survey of Essex.

The President called upon Mr. Thomas W. Reader, F.G.S., who delivered a Lecture on "Caves, Caverns and Grottoes," which he illustrated by some 100 lantern photographs. Mr. W. Whitaker, B.A., F.R.S., made some appreciative remarks on the character of the photographs shown, and a hearty vote of thanks to the Lecturer was passed by acclamation,

VISIT TO THE GUILDHALL, CITY OF LONDON (511th MEETING).

SATURDAY, 21ST FEBRUARY, 1920.

On the above date the Club visited the Guildhall and its Museum, under the direction of our Member, Mr. Frank Lambert, M.A., the Assistant Curator: over 40 Members attended.

Before the party inspected the building, Mr. Lambert gave a short lecture on its history, illustrated (with the kind permission of the Librarian), by a selection from the valuable collection of London prints in the possession of the Guildhall Library. Of the earliest Hall, he said, we know nothing, except that it stood in Aldermanbury, to the west of the present site. The Hall now standing was begun in 1411, but chiefly because of financial difficulties was not completed till a generation later. In 1422 and 1423, the executors of Richard Whittington contributed to the paving and glazing of the Hall, and in 1425 the porch was built. So the Hall stood till the Great Fire of 1666, when the open roof was so badly injured that it had to be removed and was replaced by a flat ceiling, which was intended to be temporary. At the same time the walls were raised some twenty feet, and the interior of the porch was re-built. The front of the Hall underwent another great change a century later, for in 1789 it was again re-built in the present rather grotesque fashion by George Dance, then City Architect. The last important change in the structure was made in 1864, when Sir Horace Jones removed the flat ceiling and built an open roof in the style of, but differing in detail from, the original. He also planned a new front to Guildhall Yard, and actually pulled down the eastern

wing of Dance's building before he died. In 1910 the gap was filled on the old lines. All these and a number of minor changes in the structure were illustrated by the prints exhibited.

The party then entered the Hall, and noticed particularly the only original window, discovered ten years ago by Mr. Sydney Perks, the present Surveyor, and the clear marks of the Great Fire on the stonework, which the same gentleman disclosed by removing the paint which then covered them. Proceeding to the Crypt, Mr. Lambert pointed out that the part now open to the public is only half of the original substructure, which was divided by a cross wall into an eastern and western crypt. The western crypt, however, was destroyed in the Great Fire, and brick cellars were built in its place. The party entered these cellars and examined the few remaining old fragments, which were either left when the cellars were built, or have been uncovered in modern excavations, and which show that this part, though the same in plan as the other, was simpler in style.

The Museum was not inspected in detail, because of the shortness of time, and the size of the party. The guide emphasised the fact that it contained only London antiquities and called attention to the principal acquisitions while it was closed during the war period, and to certain rearrangements before its reopening. The accessions included Roman pottery and other objects found in King William Street, Finsbury Circus, and St. Martin's le Grand; wooden corbels from the Dick Whittington Inn, Cloth Fair; wooden pilasters from the Saracen's Head, Aldgate; the sign of the Hanseatic League, carved in 1670 by Gabriel Cibber; London tipstaves and Constables' staves; various fire-marks; a silver chalice, dated 1732, from the chapel of Fleet Prison; and a pewter communion set about 1750 from Silver Street Chapel. Among the rearrangements, a series of English wine bottles is exhibited, which show the evolution of the bottle from the round-bellied shape of 1650 to the straight-sided bottle of to-day.

In proposing a vote of thanks to Mr. Lambert, Miss Lister said she had once doubted whether a visit to a museum of antiquities was quite within the scope of a Field Club; but she was reconciled when she saw how the principles of evolution were illustrated in the arrangement of the exhibits.

ORDINARY MEETING (512th MEETING).

SATURDAY, 28TH FEBRUARY, 1920.

This Meeting was held at 3 o'clock on the above afternoon, in the Physical Lecture Theatre of the Municipal Technical Institute, Stratford, the President, Miss G. Lister, F.L.S., in the chair. 52 Members were present.

The following were elected Members of the Club:—

Miss N. P. Hughes, of 56, *King's Road, Leytonstone, E.11.*

Mr. Clifford Hart, of 73, *Windsor Road, Forest Gate, E.7.*

Mr. Thomas Young, of 102, *Cranbrook Road, Ilford.*

In anticipation of the forthcoming Annual Meeting, nominations were made for new Members of Council and Officers for the ensuing year.

Mr. Avery exhibited a series of old prints and drawings illustrating the

past topography of West Ham, and made some interesting remarks upon the exhibits.

The Curator exhibited an album from the Club's Pictorial Survey of the County, containing photographs and prints of old West Ham and Barking.

Votes of thanks were passed to the exhibitors.

Mr. Charles Whitwell gave a lecture on "Old West Ham," illustrating his remarks by a number of lantern slides; the thanks of the Meeting were accorded to the lecturer.

Mr. George Morris, B.Sc., gave a lecture on the "Regional Survey of Saffron Walden," which he illustrated by a large number of lantern photographs and diagrams.

The lecturer introduced his subject with a definition of Regional Survey as the ecological study of a human community. The community, whether a village, town, or city, may be regarded as an organism of a higher order than the individual, the units of which are united by bonds not of the flesh but of the spirit. He then illustrated his thesis by a series of lantern slides illustrating the survey of Saffron Walden. The physiography of the region was first dealt with, showing the position of the region, which embraces the obsequent valleys of the Cam and Granta on the face of the Cretaceous escarpment of the East Anglian heights; he thence passed to the geology of the region and its influence upon the hydrography, vegetation, and human settlement, concluding this series with a synthetic diagram showing the interrelation of the natural factors in establishing the sites of the human communities in the region.

Mr. Morris then passed to the prehistoric survey, and dealt quickly with the methods employed in recording the neolithic, bronze, iron age, Roman and Prehistoric Saxon remains of the district. A series of slides was then shown, showing the historic development of Saffron Walden, including restorations of the town in British, Saxon, Norman and Elizabethan times. The castle, abbey and market were briefly described and the historic survey was summarized in synthetic diagrams showing the present condition of the town and region.

The plans for exhibiting the survey in the Museum at Saffron Walden were then exhibited, and the lecturer concluded by remarking that Regional Survey was to some extent the concern of the County Associations, and suggested the possibility of co-operation in organising a regional survey, if not of the whole county, at least of certain typical areas.

A hearty vote of thanks was passed to the lecturer.

ORDINARY MEETING (513th MEETING) AND ANNUAL MEETING (514th MEETING).

SATURDAY, 27TH MARCH, 1920.

These Meetings were held in the Physical Lecture Theatre of the Municipal Technical Institute, Romford Road, Stratford, the President, Miss G. Lister, F.L.S., in the chair. 58 Members were present.

The following ladies and gentlemen were elected Members of the Club:—

Miss Janet M. Gordon.	}	<i>of the Woodford County High School, Woodford Green.</i>
Miss M. Mitchell,		
Miss E. Burgess,		
Miss L. G. Cowley,		
Miss E. Muriel Smith,		

Miss Muriel Main, of "*Almondale*," *Buckingham Road, South Woodford, E.18.*

Mrs. Ada G. Batterson,	}	<i>of 201, Earlham Grove, Forest Gate, E.7.</i>
Mr. Victor J. Batterson,		

The Rev. Peregrine N. Maitland, M.A., Rector of Loughton.
 Mr. Reginald S. Archbould, of *Forest Way, Loughton.*
 Mr. Thomas Cleghorn Baillie, M.A., D.Sc., Principal of the West Ham Technical Institute, of 110, *Hampton Road, Forest Gate, E.7.*
 Mr. Walter Russell, of "*Eppingdale*," *Richmond Road, Ilford.*
 Mr. C. T. Hook, of "*The Hoppet*," *Little Baddow.*
 Mr. S. Hazzledine Warren, F.G.S., exhibited a fragment of bone of Ox, gnawed probably by rodents, which he had picked up in Epping Forest that day.

Mr. John Avery exhibited a fine series of prints and drawings of Saffron Walden and Audley End.

Thanks were passed to the exhibitors.

The Curator drew attention to the important Collection of Birds, formerly belonging to, and set up by, the late Henry Doubleday, of Epping, which, through the kind promptitude of a friend, had just been secured for the Club's Museum, at an insignificant cost. The specimens, some 112 in number and beautifully set up, were contained in five glazed cases, and had been purchased by the late Mr. Arthur W. Smee, at the Doubleday Sale at Epping on August 23rd, 1871, and had remained in the possession of his family until now.

The business of the Annual Meeting was then proceeded with.

The Minutes of the last Annual Meeting were read and duly confirmed.

The Hon. Treasurer presented his Accounts for the year ending December 31st, 1919, and moved formally that they be received and adopted. Mr. E. T. Newton, F.R.S., seconded. On being put to the Meeting, the motion was carried unanimously.

The Hon. Secretary read the report of the Council on the work and progress of the Club during the past year. On the motion of Mr. J. Ross, seconded by Mr. E. T. Newton, the report was adopted.

No nominations having been received other than those made at the meeting held on 28th February last, the President declared the persons then nominated to be duly elected as new Members of Council and Officers for the ensuing year, as follow:—

As *President*, Mr. Robert Paulson, F.L.S., F.R.M.S.

As new Members of Council, the following:—

At the Meeting on 28th February, four retired from the Council in rotation: Miss E. Willmott, F.L.S., V.M.H., Mr. E. N. Buxton, J.P., D.L.; Mr. J. E. Harting, F.L.S.; and Mr. R. Paulson, F.L.S., F.R.M.S. The first three were duly re-elected.

To fill vacancies on the Council, due to the elevation of Mr. Paulson to the Presidency, and to the decease of the late Lord Rayleigh, Sir Thomas Barrett-Lennard, Bart., and Mr. Gerald Buxton, J.P., were elected.

As *Hon. Treasurer*, Mr. John Avery, F.C.A. ; as *Hon. Librarian*, Mr. F. J. Brand ; as *Hon. Secretaries*, Messrs. W. Cole, A.L.S., and Percy Thompson, F.L.S. ; as *Hon. Editor*, Mr. Percy Thompson, F.L.S., assisted by Mr. Henry Whitehead, B.Sc. ; as *Auditors*, for 1920-21, Messrs. C. Nicholson, F.E.S., and C. Bestow.

The Members of the Cole Pension Committee (viz., Miss G. Lister, Messrs. Avery, Christy, Whitaker, and Thompson), were, on the motion of Mr. E. T. Newton, F.R.S., seconded by Mr. S. Hazzledine Warren, F.G.S., re-appointed for 1920-21.

The Hon. Secretary reported that the Council had had under its consideration an alleged attempt to secure the enclosure of portions of Wanstead Flats, and elsewhere in Epping Forest, for the purpose of permanent allotments, and that it recommended the Annual Meeting to pass the following Resolution :—

“ This Meeting of the Essex Field Club views with alarm and indignation the proposal to introduce a private Bill into Parliament with the object of securing the enclosure of portions of Wanstead Flats and Epping Forest for the purpose of permanent allotments, and calls upon the Government to oppose this attempt to nullify the provisions of the Epping Forest Act of 1878, which requires the Forest to be preserved ‘ unenclosed . . . as an open space for the recreation and enjoyment of the public,’ for ever.”

The Resolution was formally proposed by Mr. W. Whitaker, F.R.S., and seconded by Mr. J. Ross, and, after discussion, was carried *nem. con.*

Miss Lister then vacated the Presidential chair, which was assumed by the new President, Mr. Robert Paulson, who thanked the Members for the honour paid him by his election, and who spoke of the past and continued activities of the Club in the causes of education, and of the preservation of open spaces, and in other directions.

Mr. Paulson then called upon the retiring President to deliver her Address, “ On the Conifers of Suburban Gardens,” which was illustrated by lantern slides, and by an extensive exhibition of herbarium specimens and of living plants.

At the conclusion of an interesting Address, questions were invited and replied to by Miss Lister.

The President moved that the best thanks of the Meeting be accorded to Miss Lister for her Address, and that she be asked to allow it to be printed and illustrated in the Club’s journal. The motion was carried by acclamation.

The proceedings then terminated.

BRITISH OYSTERS : PAST AND PRESENT.

By ALFRED BELL.

IN trying to work out the relations of the different oysters in our Eastern Pliocene (Crag) deposits, I found it necessary to extend my studies to those of the later periods, and to those inhabiting our present seas and estuaries, confining myself as much as possible to localities that have not been re-stocked from outside sources. The question of what connexion the various forms I shall refer to may have with each other I shall not enter into, as it is enough for my purpose that they fall more or less into groups, easily distinguished, and easily recognized, and these groups, whether regarded as specific or varietal, should have a distinctive name by which they may be known.

Dr. Jeffreys (*British Conchology*, vol. ii., p. 165), in writing of the British forms, says that "its variability of shape has long made the common oyster a favourite subject for species making," but as a well-known conchologist writes to me, the study of the genus *Ostrea* has been almost "universally shunned, or scamped by most writers." Dr. Dall remarks (*Proc. U.S. Nat. Mus.*, vol. xxiv., p. 934, 1902), in writing of certain *Astartes*, "whether these be regarded as species or not, we have the satisfaction of knowing what we mean when we employ a name."

Prof. E. von Martens goes still farther, saying that "it is desirable that every local form that is well marked, zoologically or geographically, should have a distinct name."

Mr. Coward (*Migration of Birds*—Camb. Univ. Press, 1912), says also "the study of races and species, or local variations, is commanding more and more attention, the patient work of the "splitters" scorned by the old school of lumpers will eventually solve many of the questions of the day," and the "Father of British Conchology," Dr. Martin Lister, adds in a MS. note in his own copy of *De Cochleis*, 1685, (taken from Pythagoras, B.C. 550)—"the imposition of names on things is the highest part of wisdom."

Fortified by such authorities, I have no hesitation in following out their suggestions in the ensuing pages.

Much of the misconception regarding our British oysters arises probably from the want of sufficient material obtained from different sources for comparison. Thanks to the various friends who have responded to my appeal, I have now obtained a large series of shells from about fifty localities, ranging from the Shetlands to the English Channel, and from Galway to the North Sea, with others from Norway, Sweden, and Denmark (recent and fossil), and the western Mediterranean.

Towards the close of the Pliocene epoch of our geological history, the genus *Ostrea* gradually died out in the British area. Only a single valve of *O. edulis* (?) seems to have been recorded from the Icenian Crag of Thorpe, near Norwich, by Dr. S. P. Woodward (White's *Norfolk*), but the late Mr. Clement Reid discovered a number of shells, frequently double, embedded in a mass of sand $\frac{1}{4}$ mile west of Sheringham, near Cromer. These are very friable and in too bad a condition to determine, but so far as can be made out they belong to one of the numerous varieties assigned to *O. sonora* DeFrance, of which M. Bagot (*Soc. Linn. Norm.* 1903, p. 152), says M. de Gerville "en a repandu nombreux echantillons sous les nom."

The fall of temperature, as the period of the major glaciation drew on, appears to have been the principal agent in the extinction of this genus, as although it can endure considerable rigour in congenial surroundings, it will not stand extreme cold, sudden frost, or the influx of too much fresh land-water, nor will the oysters spawn or the spat survive in very cold weather. This was seen at Holy Island, near Berwick, where, according to Dr. Johnston, the original molluscs were killed off by severe frost, and had to be replaced by others from Prestonpans, at that time a very prolific breeding ground.

Oysters are not very common as a rule in Pleistocene deposits. Messrs. Crossbey and Robertson say they could not find the oysters at Dalmuir, or in any of the Older Glacial Clays of the Clyde district. I have one of the older type from Colintrave, in Bute. For this scarcity the burrowing worms and sponges are perhaps responsible, as many of my examples from old raised sea-bottoms are dead shells, which have been practically eaten away by them. Where these destructive agents are few or absent, as at March, and in the Estuarine Clays, the

shells are plentiful and usually in fine condition, as in the case of other genera.

M. Sars (*Edin. New Phil. Mag.* 1863) records the oyster from the Glacial Beds of S. Norway, at Kellebo, in Rakkestaat, at 300—440' elevation. In the Christiania region, Brgger makes the great Oyster banks the earliest post-glacial deposits; these and the succeeding *Tapes* banks are possibly the equivalent of our Irish Estuarine Clays, as well as those of the Nar Valley and Grangemouth. Oyen gives Trondjhem for its farthest appearance northwards in a post-glacial deposit, where specimens are found 105 mm. long. Thick masses of shells abound on the shores of the Cattegat, where the oyster flourished during Neolithic times, as the hundreds of shell-heaps testify, some of them being banks 1,000 feet in length, by 80 to 150 feet in breadth. The shells are of the usual size, but, owing to the influx of fresh water from the Baltic during the *Ancylus*-sea period, died out, as the mollusc cannot exist in water containing less than 16 or 17 parts in 1,000 of saline matter. (Sir H. Howorth, *Geol. Mag.* 1905, p. 461). Forchammer [*Trans. Geol. Soc.*, vol. v. (1837-40) p. 159] reports that in Holstein at 150 feet above sea level a bed of pebbles with *Cardium edule*, *Buccinum undatum* and *Ostrea edulis* occurred, the oysters being much smaller than those now living on the Coast.

Thanks to the courtesy of Dr. Odhner of Stockholm, Dr. Oyen, of Christiania, and Prof. Ravn, of Copenhagen, I am now in possession of a fair series of oysters from Norway, Sweden and Denmark, including Uddevalla, Bohuslan (recent and fossil), the Danish Kjekkenmoddings, and the Limfiord, in the North of Jutland. The Uddevalla shell in some respects approaches the Irish estuarine form in the incurving of the upper valve, but it has much more exuberant foliation or fluting on the lower valve where the growth-lines intersect the costæ, and the valves are slighter in texture with more delicate laminar growth at the margin of the shell. The Uddevalla shell has the laminæ of the top valve set very close, not projecting beyond the plain margins; lower valve with well-developed costæ, rising with hollow ridges where intersected by the annual shoots or growth-marks. The midden-heap shells approximate to the *Celtica* group in the strength of the costæ. One type of the recent

Bohuslan oyster and others from N. Jutland agree with our North Sea Hasborough shells in having a more efflorescent lamination than is usual with the East coast oyster.

The "human" history of the subject goes back to the caves, middens and shell-banks of Azilian and later days, on the northern coasts at Dunagoil, Colonsay, Oronsay, Ardrossan, Caithness, the Shetlands, N.E. Scotland and elsewhere. Many of these are of large size. Of two mounds on the shores of Loch Spynie, one measures 240 by 90 feet, the other 178 by 90 feet. Another at the Creggauns in Co. Galway (more recent) is nearly as large. That at Oronsay has been beautifully described and illustrated in *Pr. Soc. Antiq. Scotland*, vol. 48, p. 52, by Mr. Henderson Bishop, to whose courtesy I owe a fine series of valves (Plate xii., fig. 1). The mound of Cnoc-sligeach in Oronsay now stands some 35 feet above the original sea-level, and according to Prof. Scott Elliott was accumulated 6000 years B.C., when the hunting tribes, finding flesh-meat to be getting scarce, took to fishing. The shells are of large dimensions, one measuring 120 by 110 mm. The lamination on the top valve is very closely set and flattened; on the lower valve the ribs are very strong and equal in thickness to the interspaces, with a shallow ligamental area, slightly curved but of moderate breadth and length. The genus has now died out in this district, but at Colonsay banks of dead shells may be seen on the beach between tide marks.

The value of the British oysters as food became apparent to the Roman settlers in Britain as early as A.D. 50, and there is hardly a Roman site, station, or town where the shells are not present in abundance. The small Rutupinian mollusc was the one mostly in demand for exportation, but the Romans also utilised the larger and deep sea form whenever procurable, especially at Verulam, Folkestone and about London. The shells found in the dwellings of this people are a very good index to the type of shells then living on the nearest coast line; thus at Silchester they are of the Channel or Southampton type, at Caerwent and Uriconium they are of the larger or Welsh series, and on the Eastern coast mostly Rutupinian.

Our Saxon forefathers do not seem to have been interested in Oysters, as their shells are seldom or never found in or about Saxon sites.

Although the oyster was abundant all round our coasts prior.

to A.D. 1850, the loss caused by want of system in collecting, and by over-dredging, has led to the depletion and exhaustion of many of the most productive oyster-beds ; and the subsequent re-stocking of most of those on the south coast of Hants and Sussex, and elsewhere, has largely altered the original fauna by the introduction of other types.

That the oyster beds were occasionally looked after in earlier times is shown by an entry in *The Ledger Book* of the Bailiffs at Newport, in the Isle of Wight, made in Queen Elizabeth's days, 1567 *et seq.* which orders that no person was to be allowed "to dragge for oysters wyhn the haven off the toun," without a licence from the bailiffs under penalty of 2/6, and they were to be sold in the market, "a hundred told by syx skore for ijd. and no derer." Great oysters gathered by hand for iiijd. Every boat owner had yearly "to gadre in the sea at large a bote full of Oystrys called ffoye, and put the said ffoye yn the haven off the Toun in the sight of the bayllyfs or their Sergeauntes," under penalty of 3/6.¹

On the west coast of Scotland, Professors Kerr and Gregory, of Glasgow University, tell me that I must not depend upon the purity of descent of the more recent shells. Yet this locality was once rich. Costa (*The British Conchology*, 1778, p. 161) says : "The bays of W. Scotland afford great plenty. In the Isle of Wacksay growing so big that they must be cut into four pieces to be eaten." Dr. Wallace in his book on the Orkneys, p. 42, also says that the largest oysters he had ever seen are got in some places near the Orkneys, requiring the same treatment. Loch Fyne, Oban, and Luce Bay to this day yield a few native shells of large size, as does Colintrave in the Kyles of Bute ; but with the exception of Loch Ryan and Loch Tarbert, where they are commercially cultivated, there is no oyster-fishing now carried on.

At one time the oyster beds in the Firth of Forth extended for 20 miles, from Mercera to Cockenzie. Dr. Wemyss Fulton, in his report on the past and present condition of the oyster beds in the Firth, 1895, says that in 1865 the Newhaven fishermen took millions of oysters from the Firth, but by 1882 the supply had so greatly fallen off that dredging was actually given up. They have now become so scarce that I have had much

¹ *Antiquary*, vol. 48, p. 81, 1912,

trouble in getting a few genuine specimens (Plate xiii., fig. 6), through the Scottish Fishery Board. The Rev. F. D. Smith, the well known Scottish archaeologist, told me that he had tried in vain to get me some living examples from the Newhaven fishermen. In the Shetlands the beds in the South Voe at Burra, extending for about a mile outwards on a soft and muddy bottom, were so cleanly scraped between 1860 and 1880, that the supply exceeded the demand to such an extent that the surplus shells were taken to sea again, and thrown overboard without any discrimination, and ultimately perished. Attempts have been made to replenish the beds, but the only suitable form, the rock oyster natural to Shetland, is difficult to cultivate, as it does not readily accommodate itself to change, and is very sensitive to atmospheric conditions (Anderson Smith, *Fishing News*, 1913).

In Ireland, the coast from Carlingford round to Cork, and to Tralee, was once celebrated for its abundant supplies, but these are no longer obtainable, except a few preserved in private oyster grounds, as at Coolmore, Cork, the beds having been nearly all worked out by 1876, and the fisheries having consequently fallen off past recovery. Da Costa (*op. cit.*) refers to the enormous quantities of this shell in Ireland, and notes especially a bed of rock oysters as large as horseshoes at Howth and others at Malahide (where a bed of dead shells occurs on the shore), and at Irelands Eye "green-finned and of a delicate flavour."

Forbes and Hanley, in the *British Mollusca*, vol. ii., 1853, note various localities in the Channel Islands, Ireland, and the West Coast as being very productive, which in less than 25 years became practically exhausted. Mr. Sinel, of Jersey, writes me that it is now difficult to get any of the uncultivated forms, but sent me some deep-water shells, after much trouble in getting them. I found the same trouble in the Isle of Man, where they formerly abounded in 15-25 fathoms of water, between Laxey and Ramsey.

Dr. Murie, reporting on Sea Fisheries of the Thames Haven, 1903, notices a few patches remaining at the Point by the mouth of the Blackwater River, and the Kentish Flats as still productive. From off Dovercourt I have some isolated shells of the original stock, obtained at very low tides.

The shell is roundly ovate or subtrigonal, mostly well ribbed

on the lower valve, the ribs varying in number and breadth, the lower valve rather shallow ; the upper valve flat, having the concentric laminae closely appressed or but little raised ; colour a uniform deep or brownish buff, margins of valves plain ; interior an opalescent white, with a white scar of the adductor muscle.

The same type is present in the Aldborough marshes, and the Roman coast encampments, the Walton-on-the-Naze raised beach, the alluvial flats at Norwich, and as far back in time as the March Pleistocene silts. They show the original oyster in this area to have been of Rutupinian type (Plate xiii., fig. 7).

Frank Buckland defined a "native" as a thorough-bred oyster, its geographical limits extending from Harwich to Margate at or about the mouth of the Thames, and indigenous to the soil. Most of this district is under cultivation, and it is only here and there that a few natural freely-fished beds are found ; the cultivated area includes the Colne, Faversham, Whitstable, and Medway, but the brood has been so often replenished, that the original type has been nearly lost. The Milton oysters, true Rutupinian, are perhaps the purest of the East Coast breeds. The present "Colchester" natives are the result of careful selection and do not represent the aboriginal species or variety. The South Coast from Dorset eastwards to Colchester has been virtually peopled from France and the mid-Channel, and hardly an aboriginal native is left, and only a few deep-sea shells, mostly of large size, are now to be had.²

The continual waste of the coast line by denudation is partly responsible for the scarcity of oyster beds off the Norfolk coast beyond Burnham and Happisburgh. Although from the recurrence of names, such as Oysterness, on the Humber Estuary their former presence may be inferred, the shell is not given in Wood's list of the marine Mollusca of the Yorkshire coast (*Hull Museum Publication*, No. 91, 1912), the bulk of the shells found at the holiday resorts on that line of country being mostly American Blue-points, Portugese, or importations. For many years before and even after 1820, the extensive oyster banks off Happisburgh, Norfolk, now almost exhausted, yielded a never-

² Solent oysters grow very large. Philpots mentions one he bought which was 6½ in. long by 5½ in. broad, and another from off Christchurch which was 7 in. by 7 in., and weighing 3½ pounds. I have had them from off Newhaven nearly as large.

failing supply of the mollusc. It seems to have supplied Lister in 1678 with his type, *Ostreum vulgare*.

The bay of Cromarty and the Moray Firth still produce a few of medium size if my Banffshire specimens are representative, as they seem to be. The shells from the drift of Burstwick, Kelsey Hill, etc., in the Holderness district, have much affinity to these, and are, I imagine, of the same group.

Prof. E. Forbes, in his paper "On British Marine Zoology," *Rep. Brit. Assoc. Adv. Sci.*, 1850, p. 268, wrote "That the diffusion of Lusitanian forms along our southern shores and for some distance up the St. George's Channel is due to the action of southern currents, and their climatal influences, must be evident to any person who will compare the range of those species with the course and extension of Rennell's current." This "affects an area extending from our S.W. English province round the western coast of Ireland, impinging on the western shores of N. Scotland," along which many organisms are found that are rare or absent in the central portion of the Irish Sea. This is particularly noticeable in the foliated oysters which extend from the Mediterranean to Norway. Tenby, Swansea, and the S.W. English Channel are particularly favoured in this respect. Some other colonists will be referred to in due course.

From very early days currents seem to have been at work, not only in transporting exotics to our shores, but also in disseminating loose floating oyster-spat, and forming fresh scalps elsewhere. This will account for the presence of forms other than those common to the locality, most places yielding two or more varieties or forms.

Oysters vary much in the colour and composition of their shells, ranging from a dead chalky white, to a very delicate pearly opalescence, and are often tinged from pink to a dark purple, especially in western shells, where the muscle-mark also is darker than in those of the eastern coast. This is certainly more than an accidental variation. A true Whitstable native has no stain inside, or only one of a very faint blue. Foreign spat laid down in these beds produces a shell marked by deep stains, and of a chalky whiteness.

The external sculpture has its uses in determining the several groups, thus examples I have from the Nar Valley, Brancaster, Durham (Roman), Findhorn (Moray), and other places in the

east, show incipient costal ridges which I have not noticed in western shells. The "plaits" or shoots shown on the under valve increase yearly, and are fairly regular up to five years of age, when they have a tendency to become irregular, and often foliaceous at the sides, increasing in breadth from time to time, thickening internally. The shell is often camerated, or becomes spongy and loose in texture, and subject to the attack of many lithophagous annelids, and boring sponges.

In shape the shell is variable, mostly rounded, or if the apex is produced, pyriform. The round form frequently becomes falcate, the lower portion curving, usually to the left. This is very noticeable in the *O. estuarii* group. The curvature and position of the apex, whether turned to the left (its normal place) or to the right, does not seem material to the growth of the mollusc, its position being determined by the way the spat falls. The umbo of the lower valve is frequently elongated in old shells, and is mostly chambered.

The ligamental area in the type *O. edulis* and its allied forms is trigonal, enlarging with age and exhibiting lines of accretion in normal conditions, but is subject to the mode of growth by the umbo, sometimes becoming long and attenuated.

The disposition of the ligamental area and the apex has little relation to the rest of the shell, except so far as the body position of the animal is concerned, the position of the adductor scar agreeing with the right or left inclination of the apical portion of the shell. The thickness of the aged or enlarged apex is illusory, as in one Selsea Bill shell, with area 25 mm. long, and 12 mm. thick, it is made up of hollow concamerated chambers.

Having attained maturity, the animal ceases to grow bodily, but enlarges the shell by the deposition of additional shelly matter, seeming as if it shrank itself in the process of doing so. The so-called bottom valve in deep water individuals is not infrequently coated with masses of *Serpulas* and *Balani*, parasites seldom seen on the flat valves.

OSTREA EDULIS Linné.

While all writers agree that Linné uses the name *ostrea edulis*, some of them differ as to which of its numerous varieties he referred to. His diagnosis (*Syst. Nat.*, x., p. 699, 1758) "*testa*

semiorbiculata membranis imbricatis undulata, valvula altera plana," Habitat Oceano Europea is vague, and his later or other references are little better. Linné's own collection, now in the possession of the Linnean Society, contains but two oysters that need be referred to here. One is *O. crista-galli*, the other a coloured and foliated shell identical with that figured by Messrs. Bucquoy, Dollfus and Dautzenberg (in the *Moll. Mar. Roussillon*, vol. ii., pl. 2, fig. 22) as *O. edulis*, var. *cristata*.

Of the numerous figures Linné referred to, the most reliable is that of our own countryman, Dr. Martin Lister, who had described and figured a British oyster, as *Ostreum vulgare*, as early as 1657 in his *Historia Conchyliorum*, the figure being repeated in the *Hist. Anim. Angliæ*, 1678, tab. 4, fig. 26, which Linné refers to. It represents an adult shell with a roughly or closely ribbed under valve, foliated at the circular growth-lines, similar to those I have from Mersea Island.

Authors are not only divided as to the true Linnean type of *O. edulis*, but also as regards its geographical range. Jeffreys, in his *Brit. Conch.*, vol. 2, gives it from Iceland on the authority of Mohr, 1770, but all Northern writers repudiate Mohr's statement as being made on a doubtful record. The shell is not known farther north than Drontheim. Odhner does not record it in the Marine Mollusca of Iceland (*Arkiv. for Zoologie*, 1910), neither does Prof. A. Jensen in the *Danish Ingolf Expedition*, Copenhagen, 1912, who expressly says that Jeffrey's reference is founded in error. Its most northern locality is in the Farøes, where a young individual 8mm. by 10 mm. was dredged attached to a *modiola*. As no banks of these shells are known to exist there, it probably came from the Shetlands, where they were once very abundant.

McAndrew (*Rep. Brit. Assoc.*, 1856, p. 135), says it is "subject to much variation, but the common English or Welsh oyster is certainly abundant at the head of Vigo Bay and I have dredged it off Cape Trafalgar and Malaga, but have not noticed it further east in the Mediterranean"; and Jeffreys (*Ann. & Mag. Nat. Hist.* 1856), says "I certainly never met with the common form of our oyster, whether native, Welsh, or "rock"³ in the Mediterranean, nor is it mentioned by Philippi, or Payraudeau as a recent species." Later, in the *Brit. Conch.*, vol. 2 1863, Jeffreys

3 The term "Rock" simply means that the variety was taken on rocky ground.

"can answer for the common forms being found at Cannes." I have myself recorded it from Biot, near Antibes (*Journ. de Conch.*, 1870, vol. xviii., p. 354), but in view of McAndrew's very definite statement I doubt the correctness of my identification. Still later, when his views had enlarged, Jeffreys (*Proc. Zool. Soc.*, 1879, p. 555), extended its range from Iceland to Mogador, the Mediterranean, the Sea of Azov, Nova Scotia and Newfoundland, and, as a fossil, from Scandinavia to Turkey. I regret to say I cannot agree with him, and to my mind it is now practically confined to the Celtic Province of Western Europe, but according to Locard has been acclimatized in Corsica. It is occasionally imported into Italy and sold in the Neapolitan fish market⁴.

Da Costa's shell is from his description a western variety or type.

Pennant's description is meagre: "It is commonly of an orbicular form, and very rugged, and so well known that description is needless."

Later historians than Da Costa and Pennant are more explicit. Montagu (*Testacea Britannica*, 1803, p. 151), described *O. edulis* "as being a suborbicular rugged shell with plates or folds lying over each other, generally of a brown colour, varying in shape and size according to the position in which it is found. Some have very strong thick ponderous shells, others are very thin with membranous plates, or laminae, obscurely and regularly striated." The latter I have referred to as *O. Devonensis* (see pl. xvi., fig. 20).

OSTREA EDULIS typica.

Shell more or less orbicular, becoming conical or pyriform where the apex is prolonged; valves unequal. Upper valve covered with close-set scales or lamellae, seldom projecting beyond the margins of the shell which meet each other. Under valve fine to moderately costate; ribs interrupted at yearly growths—colour dull brown. Margins plain. Interior pearly white or opalescent.

That described by Jeffrey (*Brit. Conch.*, pl. xxi., fig. 1.), may be taken as a typical shell. This form is most prevalent in the

⁴ Which particular variety or form McAndrew referred to is not very clear. There are no shells in his collection at Cambridge of either East Coast or Celtic type. The nearest approach to it is the delicate and beautiful horn coloured shells which I have named *O. Atlantica*.

South Eastern English area, but it is not rare in the Danish Limfiord in Jutland. The fig. 2, plate xii., is that of a very delicate shell of this type, found in the Deben river, Suffolk. It is a large shell 125 mm. long and 140 mm. broad.

The appellation *O. edulis* covers a number of forms living outside our own coasts, as well as the varieties Jeffreys assigned to it, *i.e.*, *O. parasitica*, *hippopus*, *deformis*, *rutupina*, and *tincta*. Messrs. Bucquoy, Dollfus, and Dautzenberg (*op. cit.*, vol. ii.), enumerate in addition to the type the vars. *O. tarentini* Issel, *O. lamellosa* Broc. (including *O. hippopus*), *O. cristata* Born, *O. cyrnusi* Payr., *O. adriatica* Lam., *O. depressa* Phil., *O. parasitica* Turton, *O. deformis* Lam., *O. rutupina* Jeff., with colour forms *tincta* and *bicolor*.

Carus (*Prod. Faun. Medit.* 1889-93) is not so diffuse, only admitting *O. deformis* and *O. parasitica*. Sacco in his great work, *Molluschi Terreni Terziarii del Piemonte*, etc., refers to 16 or 18 different forms under the heading *O. edulis*.

The especial features of the shell selected as *O. edulis typica* are its colour, small and closely appressed horny plates or lamellæ, and the confluent margins of the valves, the lamellæ barely passing below the verge of the upper valve.

Before going any further, I propose here to examine the varieties adopted by Dr. Jeffreys, as I am unfortunately compelled to differ from his opinion in many respects.⁵

VAR. PARASITICA, Turton.

Turton (*Conch. Dict.*, 1819, p. 134, pl. 1., fig. 8), describes a shell under this name as "glossy, colour purplish to greenish brown, with streaks of a darker hue radiating from the beaks; found on crab claws in Devonshire and on floating timber in Ireland."

The shell Turton met with on floating timber in Ireland was probably the *O. parasitica* Gmelin of the Atlantic tropics, a species very partial to the Mangroves and other water-loving trees. Thompson also records it from the coasts of Ireland. Jeffreys, who gives its range from Galway to Carthage and the Mediterranean (*Proc. Zool. Soc.*; 1879, p. 555), seems inclined to collate Turton's shell with the *O. depressa* of Philippi (*En.*

⁵ For the cultivated and marketable forms Philpot's *Oysters and all about them* may be consulted with advantage.



FIG. 1.

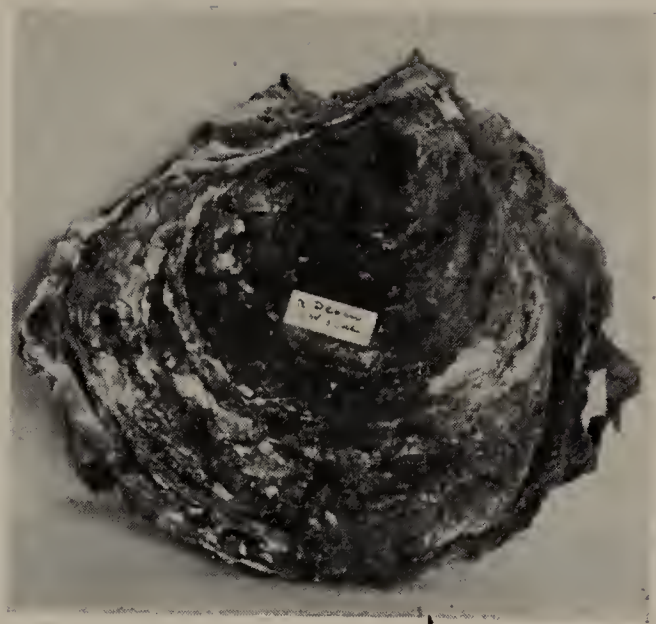


FIG. 2.

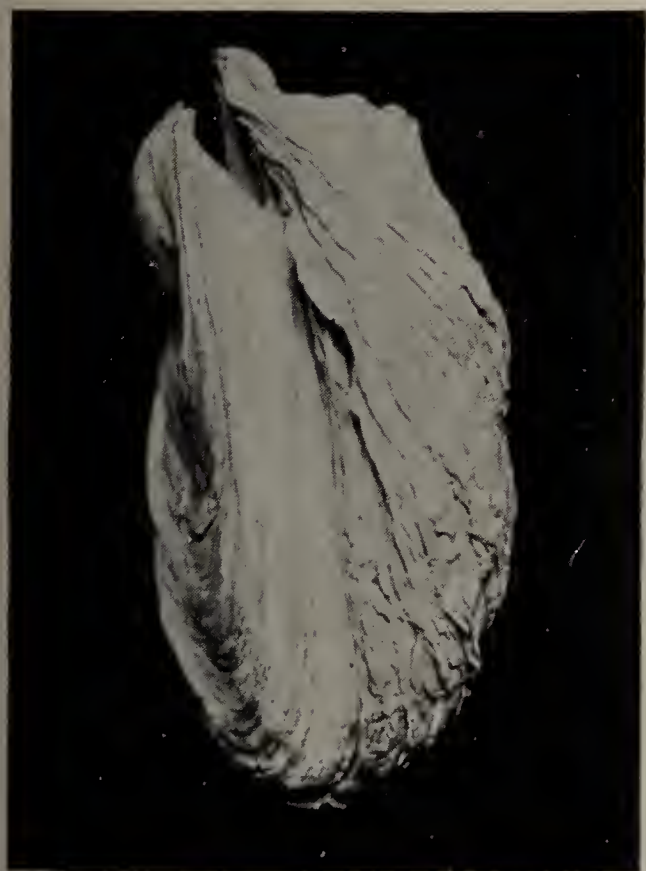


FIG. 3.



FIG. 4.

Mol. Sci., vol. i., pl. vi., fig. 3), but this according to Reeve who figures *O. edulis*, var. *parasitica* may be a species "hereditarily distinct." His figure (*op. cit.* pl. xxiii., fig. 55), taken from a specimen in Hanley's collection, is 95 mm. by 90 mm., and has been attached to a flat surface. The *O. bicolor* of Hanley is another of the same type.

Turton also figures a different species on his pl. 17, fig. 6 and 7, *Bivalve Shells of the British Isles*, 1822, of the same type as that utilized by Jeffreys (*B.C. v.*, pl. xxi., fig. 16), and Dr. Grainger and myself have also found parasitic shells in the Irish Estuarine Clays. Alder, alluding to the scarcity of oysters in the N.E. of England, mentions the young as occurring on the backs of crabs on Tyneside.

The later *Ostrea parasitica* of Turton is of no specific or varietal value, the young shells taking their shape from the substances on which the spat fell. Reeves figures it, as well as Jeffreys, but neither McAndrew nor Forbes and Hanley notice it.

Canon Norman applies the name *O. parasitica* Turton to shells derived from spat of local origin (see Coll. in Brit. Mus.)

The *O. edulis* var. *parasitica* of the Crag Mollusca suppl. 2, p. 14, should be transferred to *O. cochlear*.

VAR. HIPPOPUS Lamarck.

Shell rounded, thick, upper valve flat, transverse, laminæ closely appressed, L. 120 mm. (*An. s. Vert.*, 1836, vii., p. 219). Jeffreys describes it as "large and extremely thick, living in deep water, and solitary." Reeve also says it is "not gregarious, but solitary, living in deep water, very rough and ponderous, not at all flaky or scaly, very deep in the lower valve, and thick in the upper." Forbes and Hanley do not refer to it, and it does not appear to have been figured. H. and A. Adams have included it in their lists of species.

It is by no means certain that Lamarck and Jeffreys refer to the same shell; indeed, if continental writers are to be followed they can hardly be identical, but there is so much diversity of opinion that Lamarck's very expressive name may very well serve for our "solitary and deep sea shells."

The description applies especially to our North Sea forms like the Burnham shell, and the massive valves thrown up on Brancaster beach.

I owe to the courtesy of Dr. C. T. Trechmann the loan of a fine specimen (plate xii., fig. 3), dug up in Hartlepool Harbour at 8 feet depth in sandy clay, measuring 4 by $4\frac{1}{2}$ inches, with a combined depth of 2 inches. This example exhibits the yearly accretion of surface, there being about 40 growth lines in each valve.

Jeffreys' shell was evidently an aged example, and my own impression is that any healthy and well-nourished oyster, enjoying a quiet life in deep water amidst congenial surroundings may develop into the *hippopus* state. How long an oyster lives is uncertain. Prof. Moebius states that, although rarely met with, he had seen specimens between 25 and 30 years old, but if thickness and number of layers is any criterion, they certainly live to a more advanced age than that.

Deep-sea, or "trawled" oysters range from the Varne and Ridge Shoals in the English Channel to Burnham, in Norfolk, and the North Sea, and are a rugged type of shell, averaging 4 by $3\frac{1}{2}$ inches of good size. Shells from near the Dogger are usually very irregular in outline, undulated in every direction with numerous excrescences. They are long in proportion to breadth, and deep. One in my collection, 5 by $3\frac{1}{4}$ inches, has a depth of $1\frac{3}{4}$ inches in the very convex under valve.

Lamarck located his species from Boulogne to La Manche, and Dautzenberg et Durouchoux (*Feuille. des Jeun. Nat.*, 1914, vol. 44, p. 48,), say that the young shells they found affixed to rocks and stones in the Bay of St. Malo, probably belong to the *hippopus* distinguished by "ses côtés rayonnantes nombreuses et saillantes." Various forms have been associated with the name *hippopus* by Messrs. Praeger, Marshall, and the Roussillon authorities.

Lamarck specially notices that *O. hippopus* is not so good to eat nor so digestible as *O. edulis*, but whether this is a test of specific value has yet to be decided. Gastronomes of all periods have noted this variation of flavours, from the days of Juvenal onwards. Walfleet near Colchester was noted as early as 1622. Drayton (Polyolbion) writes of them "Think you our oysters here unworthy of your praise." T. Flatman, 1674. (Belly Gods) thought so, apparently—"Your Wall Fleet oysters no man will prefer before the juicy grass-green Colchester." Most of the oysters sold at Stourbridge fair, near Cambridge, seem to have been of this type, as it is recorded in Hone's *Everyday*

Book, 1832, that the oysters brought from Lynn were large, about the size of a horse's hoof, and were opened with pincers.

To be stupid as an oyster is a Breton proverb, and Jeffreys makes a quotation relative to its *silence* ; but sometime in the "forties" of the last century a whistling oyster made the fame of an oyster bar in Vinegar Yard, Drury Lane, immortalized in *Punch* and in most writers on London topography.

If Dicquemart is right (*Journ. de Physique*, vol. xxviii., p. 244), oysters do possess a gleam of intelligence, as he says that oysters dredged from a depth never uncovered at low tides, open their shells, lose their water and die quickly, but if placed in reservoirs and only left dry for a short time learn to keep the shells closed, and live for a considerable period when wholly deprived of water outwardly.

VAR. DEFORMIS Lamarck.

"Shell small, sub-oval, variable, fixed by the lower valve. Habitat European seas, inhabiting dead shells, more often inside the Pinna. Length, 8-11 mm." (*Anim. sans Vert.* p. 229, no. 31).

Dr. Turton (*Conchyliæ Insularum Britannicarum*, 1822), makes no reference to this form by name, but says "a small variety is found fixed to serpulæ or the inside of old oyster shells and sometimes in the cavities of rocks, with the upper valve flat and a little scaly, the under valve very convex and hollow, especially under the hinge, the beak of the concave or under valve often much lengthened, an evidence of age ; and it is frequently deformed, and distorted by contact with harder objects. It may be a distinct species, as it answers to the character given by Lamarck to his *O. deformis*."

Defrance also mentions it as a very small shell, sub-oval, variable, lower valve very thin, and fixed, 8-20 mm. in length. On dead shells.

Jeffreys describes it as small, distorted, and often nearly cylindrical ; and so far agrees with Lamarck. But the remainder of his note, and his figure, appear to refer to another shell, dealt with elsewhere, *post*.

O. deformis is also referred to by B. B. and D., in their *Roussillon Memoir*, but they observe that, like the var. *parasitica*, it may be regarded as an abnormal form of small size.

Dr. Jeffreys speaks of *O. deformis* as occupying the crevices

of rocks in the littoral and laminarian zones, and having described it as "small and distorted," figures a specimen, the only one in his collection (now at Washington), in *Brit. Conch.* v., pl. xxi., 50mm. long, which Dr. Dall tells me represents the shell very exactly, as against Lamarck's 8-11 mm. Reeve (*Ostrea*, pl. v.) figures another of Jeffrey's specimens, varying in some respects from Jeffreys' figure, and much larger. According to Jeffreys some specimens resemble the *Gryphæa* in shape. Was he confusing it with the Portuguese shell *O. angulata*, having mixed his memoranda?

Brocchi (*Conch. foss. Subap.*) describes a small shell which he names *pusilla*, 14 mm. in length, of which I have three examples from the Coralline Crag. They seem fully grown, and may be the same or allied to Lamarck's shell and like it are hollow under the hinge line. Continental writers are not much more definite, and neither Monterosato, Sacco, Seguenza, Cerulli-Irelli or Hidalgo refer to it. Carus merely says *O. edulis* var. *acrasa*, *lamellis appressis*." Prof. Issel "*O. hippopus* Lam., var. *tarentina*." Philippi makes it a variety of *O. bellovacina*, an Eocene fossil, and MM. Bucquoy and collaborateurs *O. lamellosa* Brocchi. It does not agree however with Sacco's later figure of Brocchi's type.

VAR. *TINCTA* Jeffreys.

"Shell flattened and attached at every stage; inside of a rich purplish brown, or olive green; hinge margins strongly crenulated." West of Scotland and Burra Isles, Shetland (*B.C.* ii., p. 39, but not figured). Reeve adds "regularly formed and flat."

It does not appear that Jeffreys had noticed this form prior to the issue of the *British Conchology*, and all we have hitherto known of it has been derived from the above meagre description, and the figure of the inside of the lower valve showing the colouring in Reeve (*Conch. Icon.*, *Ostrea*, pl. v., fig. 8, c.)

It is somewhat rare, being very local. I possess a fine specimen kindly sent me from Jeffreys' collection by Dr. Dall, and I have also received from Mr. James Young, of Lochalsh, N.B., a small series from Scalpa Sound, near Skye, and these enable me to complete the imperfect diagnosis quoted above, as follows:—Ovate (in young examples) to subtrigonal, apex nearly central,

pointed, anterior margin straight or slightly incurved, sloping to a rather produced margin about the lower third of the shell, with closely appressed corneous growths, not extending much beyond the margin, lower valve strongly ribbed with broad costæ, and well defined lines of growth. Surface irregular, area of ligament shallow. Height 70 mm., greatest breadth 65 mm., slight and very thin scar (plate xii., fig. 4).

I do not think that Jeffreys' note "attached at *every* stage" of growth is quite exact, certainly it is rarely so in the only examples I have seen. A Skye example in the Holmes Collection, Norwich Castle Museum, shows a conical shell, very equal sided, graduating to a pointed central apex, 33 mm. long, 23 mm. broad, possibly an immature growth.

The authors of the Roussillon memoir refer to Jeffreys' shell as a coloured form of his *O. rutupina*, but do not seem to write from personal acquaintance, and no other writers have noticed it, but it seems to be a well-marked form.

VAR. *RUTUPINA* Jeffreys.

Jeffreys describes this variety (*B.C.* ii., p. 39) as small, transversely oval, and of a regular shape. Coasts of Essex and N. Kent. In a semi-cultivated state well known in this country as "Natives." It is found in its greatest purity at Milton, the Reculvers, and Pegwell Bay, Kent, in lineal descent from pre-Roman times. It never grows very large, only 45–60 mm. long. Shell rather solid, strongly ribbed on the lower valve. Upper valve convex, shape mostly subtrigonal, occasionally much produced on the anterior side, with incurved beak. Reeve's figure (*Conch. Icon.*, *Ostrea*, xviii., pl. v., fig. 8, b), is that of a "small, regularly formed, not very flaky" variety.

The Firth of Forth oysters, the old Scottish Pandoures, now almost extinct, are of this type, and form a group by themselves (pl. xiii, fig. 6), trigonal in outline, the anterior side curving in as it descends towards the margin, carrying occasionally a spread of shelly matter like an ear near the beak, giving the shell a rounded or very ovate appearance. Lower valve costate, better displayed in some specimens than in others, top valve very scaly, loose, not depressed as usual, beaks small and frequently acute. Shell very flat and light. Thickness, back to front, 20 to 30 mm., height 85–90 mm., breadth 80–

85 mm. The valves in the Neolithic clays of the Forth Estuary, although much decayed, present the same type. The pointed anterior margin seems to be a typical feature in many of the Scottish Ostreidæ, as it occurs in the shells of the Neolithic age at Dunagoil, W. Scotland, and also in those living at Scalpa and Loch Sween, Argyll. It is also found present in the Helston (Falmouth) shells, and in the eastern beds at Kelsey Hill, March, and Felixstowe (Roman) (plate xiii., fig. 5). It may be, as already suggested, a sign of full growth, as seen in the *O. tincla*, *O. tarentina*, and the Fairlie shell. These latter have all immersed top valves, and in this respect vary from the Forth examples, which are equal margined; and *O. rutupina* seems to be an oblong shell up to a certain point, and then to enlarge laterally.

VAR. *CELTICA* var *novo*.

This variable group includes the larger portion of the oysters having their original home in the northern seas; Shetland, from the abundance of its shells, both dead and living, appearing to be its metropolis. Their chief traits are their size and strength, and the strong costæ on the lower shell, varying from ribs close-set (plate xiii., fig. 8), to others broader and wider apart. This group ranges from the Shetlands to the Irish Channel, and round to Cork, but as before stated shells are now seldom obtained living except by trawling, and as dead shells in the Kitchen Middens on the Scottish Shores, and the scalps lying between tide marks in many places. It does not appear to come into the English Channel, or very far down into the North Sea. The shells are nearly always thick, strong, and massive, and range in shape from pyriform, especially in the more northern localities, to rounded or ovate further south, though no fixed rule can be laid down. Broadly stated, the elongated shells seem to be the oldest type.

I owe to the good offices of Mr. Duthie, of Lerwick, a series of oysters from Shetland, once apparently rich in these molluscs, but now found only at two localities, Burra and Basta Voe which yield a few examples, banks of dead and old shells now representing the old oyster fauna.

The shells are fairly strong and stoutly built, and of a good size, my largest specimen being 5 inches (125 mm.) in length, the

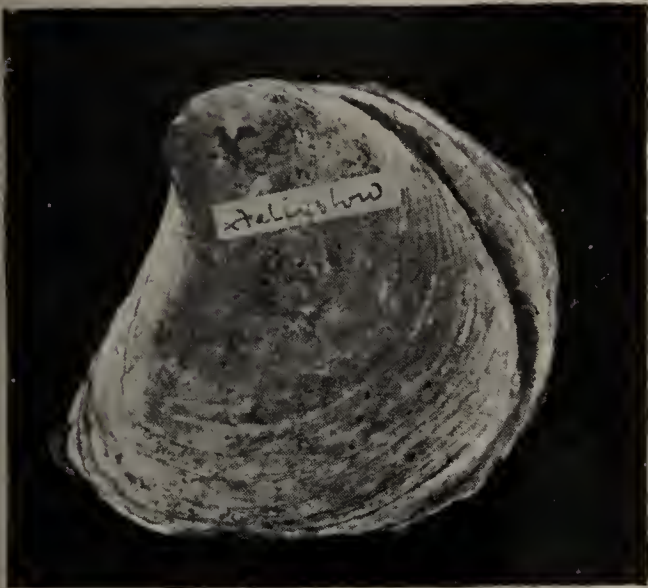


FIG 5

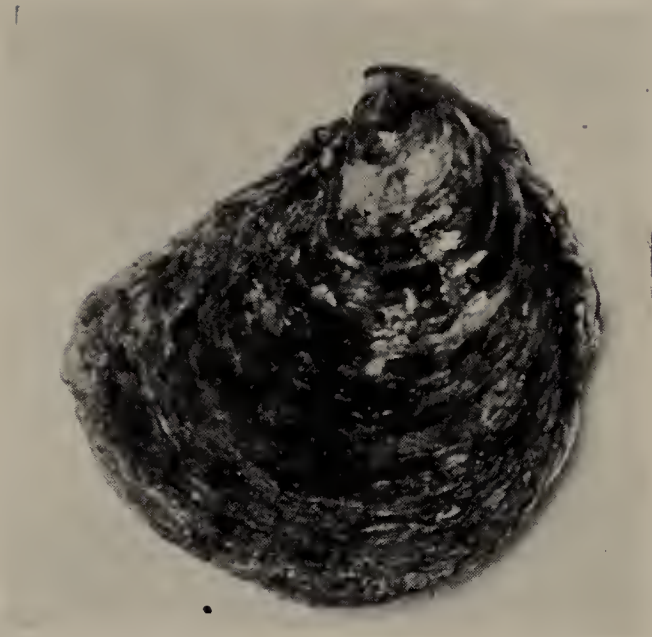


FIG. 6

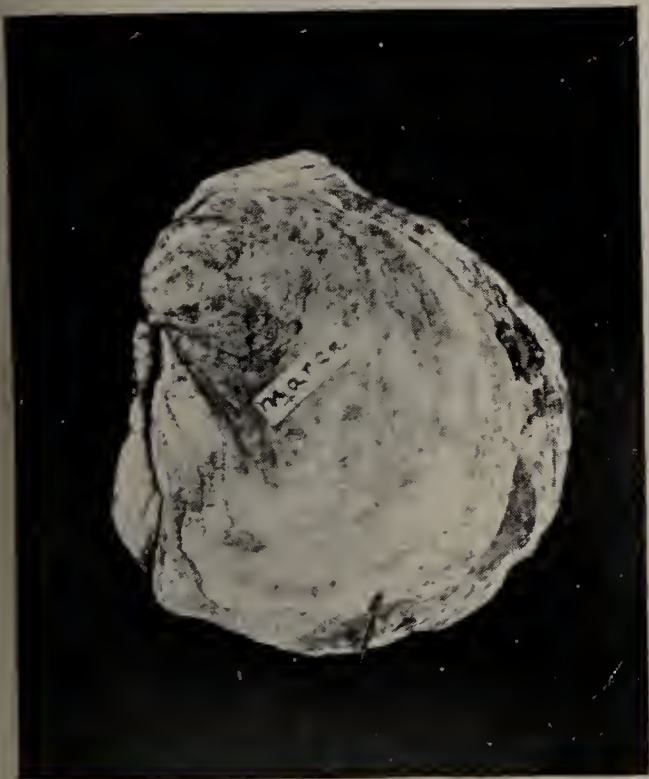


FIG 7.

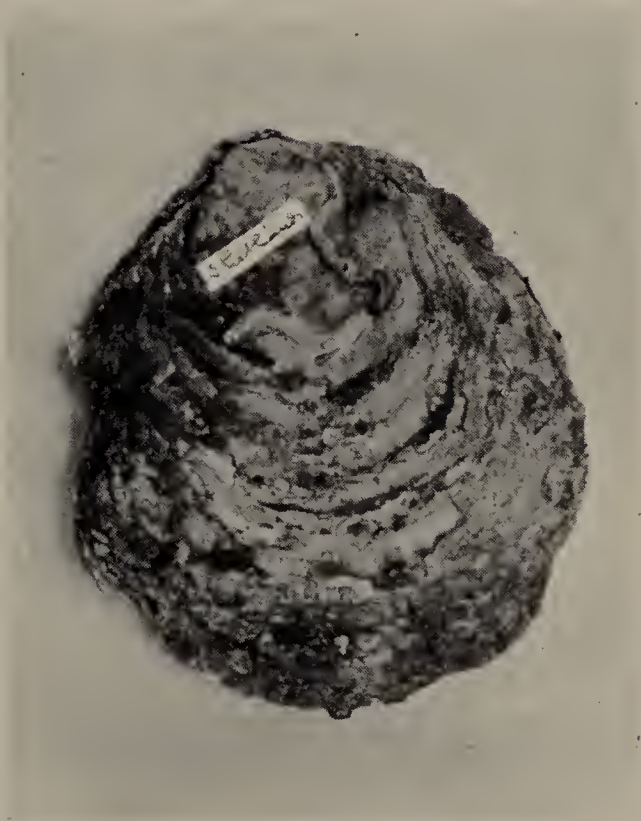


FIG. 8.

average breadth being about $3\frac{1}{2}$ inches (85 mm.), and are nearly always ovate-oblong in outline, beaks but slightly projecting, lower valve convex, upper one slightly so ; lamellæ rather prominent. The lower valve exhibits well defined to strong ribbing, the costæ regular and co-equal in size to the interspaces, becoming slightly vaulted at the intersection of the yearly shoots ; margins entire. The ligamental area is moderately broad, hinge nodules well marked, colour inside white to purple in blotches. Scar lunate. (plate xiii., fig. 8).

A very old shell from a deposit of some antiquity at Hillswick, in the Shetlands, exhibits the pear-shaped interior of the shell, and the accretionary growths seen in the Irish Estuarine types, and the lateral expansion of the ligamental area which seems to be characteristic of age.

Mr. Garstang, (*Vict. Hist. Essex*, p. 81, 1903) says " numbers of dead shells occur where living animals are seldom if ever found, I often think that many of these dead shells* are of a more elongated shape than the modern living varieties."

The Manx oyster fishery is now practically extinct. I owe to the Rev. S. N. Harrison, of Ramsey, two or three examples obtained from deep water by the fishing boats, in 15-20 fathoms off Ramsey, and dead valves may be found on the beach. They represent a strong and large shell, length 5 inches, breadth $4\frac{1}{4}$ inches. The interior is a dull, chalky white, like most of the other members of this series (plate xiv., fig. 9).

Prof. Forbes, in describing in the *Mag. N. Hist.* 1839, p. 217, a shell bank five miles off Ballaugh, refers to the oysters he dredged there ; they were never in great numbers, but very large, muscular and thick shelled ; half-grown specimens were rare, and he had never seen a very young shell. The oysters seemed to be the aged survivors of some former colony. Most of the examples were dead shells ; the living generally perforated by *Cliona*.

Wexford shells, both raised beach and deep sea, belong to this group. The shells from the early gravels at Blackwater closely resemble the smaller valves I have from Cnoc-Sligeach, Oransay. The same may be said of the shells in the limestone drift in Ballybrack Bay, as of those found at Malahide, near Dublin, between tide marks.

*Such as are found in the Pleistocene peat in the River Orwell.

Specimens from Coolmore, Co. Cork, are large, ovately trigonal to ovate, but vary much because of the irregularity of their growth; massive, the laminae on the top being densely set and with numerous narrow and usually close-set costae on the lower valve, apparently continuous, as the growth lines are not very prominent.

Deep-sea shells from Jersey are now scarce, and of great beauty in their sculpture. One I had sent me by Mr. Sinel, of that Island, is fully 5 inches in length, with a breadth of $5\frac{3}{4}$ inches, full-grown, and slightly thickened. The upper valve is flat, the lamellae being finely imbricated and thin, the lower valve deeply costated, rising where crossed by growth-lines into tubular projections. As is the case with many of the Western shells, the upper valve sinks into the lower one, due to the loss of the horny matter projecting beyond the margin of the valves.

The shell, which is probably the same as the *O. lamellosa* of Continental conchologists, grows to a full size, $5\frac{1}{2}$ inches by 5 inches, and compares with the Roussillon examples (Mediterranean) figured in the memoir quoted above, and with the living Mediterranean shells in my own possession, but I do not think it is the species described by G. Brocchi, no authentic figure having existed till 1897, when it was published by Sacco, many years after Brocchi's death (*Moll. Terr. Terz.*, pt. xxv., pl. ii., fig. 3). The need of an accurate figure of Brocchi's shell was shown by the many species or forms that have been assigned to it. It is not referred to by Deshayes (Lamarck) 1836, Carus, Hidalgo, Monterasato, or Jeffreys directly. Cocconi and MM. Bucquoy and his colleagues refer it to *O. hippopus*. Cerulli-Irelli (*Pal. Ital.* xiii., pl. 3, fig. 4), figures a shell as *O. edulis* var. *lamellosa*, which does not agree with the photo in Sacco any more than this does with the shell given in Reeve, *Conch. Icon*, vol. xviii., fig. 54 (*Ostrea*) which was identified as *O. lamellosa* by Philippi direct. The shell marked as *O. lamellosa* in the McAndrew Collection, Cambridge, has the laminae broad and flat corresponding to the shell referred by Defrance to *O. cristata* Lamarck (not Born). The absence of a typical figure may have allowed free play in the views of different authors, judging from those of Hörnes and Fontannes respectively. According to Monterosato (*Ann. del Museo Civico*, vol. vii., p. 2), it is the *O. ruscuriana* of Lamarck, and should not be confounded

with the fossil *O. lamellosa*, or the northern *O. hippopus*. I do not know Brocchi's shell as a recent species, and Jeffreys, when revising Brocchi's collection, passed it over as *O. edulis*, as might be expected (*Q.J.G.S.*, 1884).

VAR. ESTUARII var. novo.

Hyndman (*Rep. Brit. Assoc.*, 1857, p. 225), remarks that oysters were abundant in Belfast Bay from low water to 25 fathoms, and were taken by line at 45 fathoms off the Copeland Islands at the mouth of the bay, the oysters known as "Carrickfergus Oysters" attaining a great age. Unfortunately these large oysters are no longer procurable, the Belfast Lough not paying to fish. The ancestors of these molluscs abound in the Estuarine Clays in the Alexandra Dock, Belfast, and in the rich shell-banks at Magheramorne, Lough Larne. Bedded originally at about 5 fathoms deep in the *Thracia convexa* zone, as suggested by Mr. Praeger, they now exhibit in Lough Larne a thick mass of shells. They occur mostly in pairs, but single valves of great weight are common, one now in the Belfast Museum weighing five pounds, and of corresponding size. A full account of the Estuarine Clays and their magnificent fauna may be found in Mr. Praeger's valuable and exhaustive report on the N.E. Estuarine Clays (*Proc. R.I. Acad.* (iii.) v. 2, no 2, 1892). The estuarine shells vary in shape, looked at from the outside, from ovate, trigonal, or broad-shouldered, to a curved or crescentic outline. Inside, this variation is less apparent, which is largely due to the spread of shelly growth at the sides.

As this race, or group, so far as I am aware, has not been described in detail, a brief notice may be useful (plate xiv., fig. 10).

Sculpture (lower valve) strong, well defined costæ traversed by broad lamellæ, rising into tubular ridges on the costæ in the earlier growth, these dying out as the shell advanced in age and thickness, leaving a plain, non-indentate margin. The shell seems to have grown normally to a length of 3-4 inches before the alteration in sculpture and lateral deviation ensued. The ligamental area varies much, where the shell is much drawn out it may be as much as 30 mm. in length and 15 mm. in breadth. The scar is large, and in old shells is cut off below from the rest of the valve by a thick growth of shelly matter (see Chambrage, *Of Oysters*, p. 8.)

The upper valve exhibits numerous close-pressed fairly broad lamellar growths, the edges hardly rising above the flat surface, the umbonal area is usually depressed or flattened. Inside, the inhabited portion of the shell in the older examples is pyriform, becoming attenuated towards the wide and generally shallow ligamental area, terminating in an acute and sinuous point in the younger shell, and widening below in a posterior lateral direction.

The variation in shape is due to the way in which the accretionary shell-matter has been disposed on the anterior side of the umbonal region (plate xiv., fig. 12) and this may extend to as much as $1\frac{1}{2}$ inch beyond the natural margin of the inhabited portion; the breadth over all may be from $3\frac{1}{2}$ to 5 inches, the narrowest shells being usually the longest. Inside the variation is much less apparent. Plate xiv., fig. 12, gives a fair idea of the habitable shell.

A. S. Stewart was the first to call attention to these shells. In a paper published many years after its reading (*Proc. Belfast Naturalists' Field Club*, vol. xx., p. 17) he mentions finding immense specimens of the solitary deep water variety of the oyster *O. hippopus*. Canon Grainger (*Dublin University Geol. and Bot. Proceedings*, vol. 1, 1859), says the shells occur of immense size in innumerable myriads. The earliest figure I have seen of this type of oyster is in Brown's *Rec. Con. Gt. Britain* (pl. xxii., fig. 19), being that of an old Firth of Forth specimen. A thick bed of these shells occurs at Grangemouth, where the shells are large and solid to a degree seldom attained by the normal form in the present area. They also occur near Micklewood, five miles west of Stirling, under 18 feet of clay, but several feet above high water mark. Nordmann figures a shell of this kind from the Danish Middens.

In the Nar Valley, Norfolk, at West Bilney and Narford "large antiquated specimens are common" (S. Woodward, *Geol. of Norfolk*). A specimen in the Museum of Practical Geology, London, measures 7 by 4 ins. in its dimensions, length of ligamental pit 2 ins., breadth $2\frac{1}{4}$ ins. Marshall and Praeger correlate the Irish shell with *O. hippopus*, but it does not agree with the North Sea shells, nor does it occur in the English Channel

It may be noticed that all these deep estuary oysters are very dark in colour, almost black.

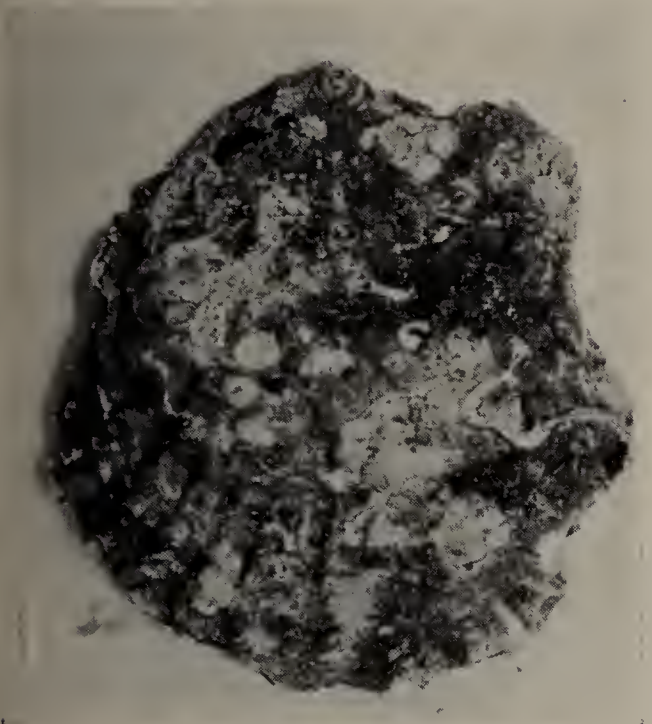


FIG. 9.



FIG. 10.



FIG. 11.

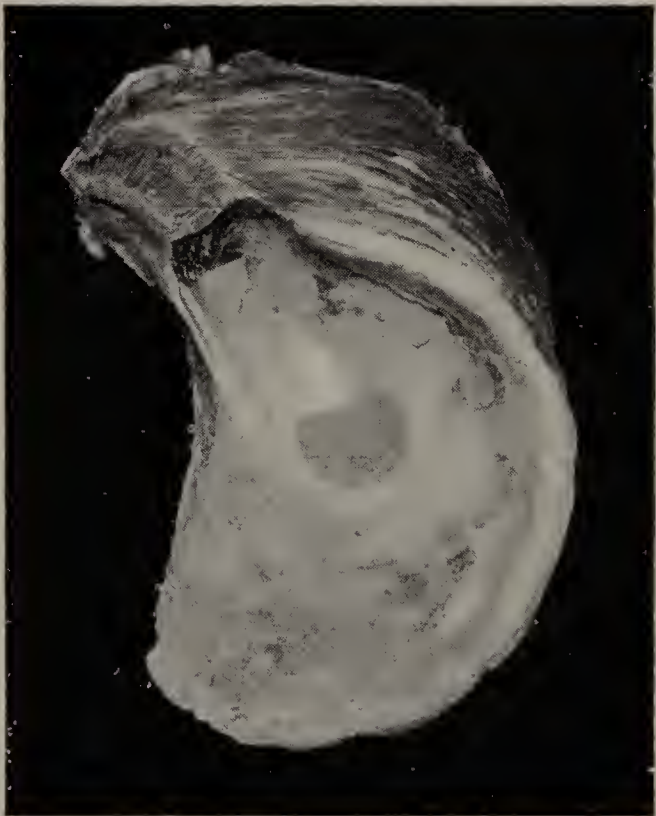


FIG. 12.

VAR. TENBIENSIS. var. novo.

(Plate xvi., fig. 17).

This is the oyster described as *O. edulis* by Turton (*Brit. Faun.*, p. 162) as "suborbicular, rugged, with undulate, imbricate scales, one valve flat and entire, shell varying much in size and bulk, generally brown with unequal valves, the upper one flat, the lower very convex and rugged, transversely striated and often longitudinally ribbed, pearly white inside, beak rather oblique, with a row of small knobs running down each side," and subsequently (*Bivalve Shells of the Brit. Isl.* 1848) as a "shell roundish oval, with scaly foliations, the upper valve less and flattened, and the inner margin very entire." The above description corresponds very well with a large number of specimens I have received from Tenby. The Tenby shell as a rule does not attain very large dimensions, my largest specimen measures $4\frac{1}{2}$ inches, breadth $3\frac{1}{2}$ inches (100 mm. by 90 mm.), but Mr. Ridsdale, F.G.S., tells me that at Waterwynd, Tenby, he finds large isolated individuals. One I have seen from Caldy Island measures 150 mm. in length by 130 mm. in breadth.

I have separated this as a group, partly because Turton makes a specific note of it, and it seems peculiar to West Britain. It is very probable that it represents a survival of the original, long and massive *Celtica* group.

With much hesitation I have referred to the foregoing groups as being varieties of the one species *O. edulis*. It is not a matter of much importance whether they are so regarded or are not. Further research will, I think, show that we are mainly dealing with specific and not merely varietal forms. As a rule they have nearly all dark coloured plain margins with closely appressed laminae on the flat valve, and are characteristic of the Celtic province, while those of the South and Atlantic coasts are more or less coloured and have the laminations large and extending beyond the margins of the upper or flat valve. The loss of these usually causes great inequality in the dimensions of the two valves, allowing the flat valve to sink into the lower one.

OSTREA ATLANTICA sp. novo.

Lamarck has utilized the name *O. cristata* for a Senegalese shell referred to by Adanson (*Hist. du Senegal*, 1757, pl. 14,

fig. 4). The shell is described by DeFrance as "very thin, rounded, dilated, upper valve flat, much smaller than the lower; lamellæ membranaceous, imbricated and very distinct." The scales are a yellowish brown colour, large and loose, and allow the upper valve to sink in when removed. A fine example of this shell is in the British Museum collection, and a shell very similar to this comes into the lower English Channel, from whence the trawlers occasionally bring them in. These grow to a large size, one of mine being, length 130 mm., breadth 135 mm. The top valve is thin, the horny lamellæ projecting nearly half-an-inch beyond the margin of the shell. The lower valve is very broad and shallow, with numerous costæ foliated below, and at times purple in colour.

The McAndrew Coll. (Cambridge) has a cluster of these shells from Gibraltar, very delicate in texture, almost transparent. It is the Atlantic equivalent of the *O. edulis* of the Eastern British coasts, and has probably furnished the name to Mediterranean conchologists.

I obtained, through a fisherman, a number of oysters from Caldy Island, collected at low water, in which the upper valve is deeply recessed into the lower one. The shells are fairly large, roundly subtrigonal, white or porcellaneous within, muscle mark not stained. Lower valve deep, not very thick, ribbed and fluted on the widely distended margin. Upper valve flat with rather broad horny scales. The lower valves are in nearly all my specimens coated with cemented sand or calcrete—at present I am disposed to refer them to *O. Atlantica* and to the Welsh oyster of McAndrew.

Some shells received from Carlingford Lough are very tender and delicately lamellated on the upper valve, the margins and the valves being confluent. They belong to the group *a* figured in Miss Massy's plate¹, but appear to be larger examples if they are of the same variety, measuring $3\frac{1}{2}$ by 3 in. in length. (Plate xvii., fig. 22.)

I have also some oysters from Cullanamore, Co. Sligo, which I cannot place. They have a pointed ovate outline, and a swollen or curved upper valve.

OSTREA CANTII sp. nov.

I have received from Mr. A. S. Kennard, F.G.S., a number
¹ Irish Fisheries Scientific Investigation No. 11, 1913, pl. 11, fig. 6—7.



FIG. 13.



FIG. 14.



FIG. 15.



FIG. 16.

of fine examples of a nearly extinct type of oyster, obtained by him from an early oyster-pond of the Roman period at Hampton, near Herne Bay, Kent. The shells occurred in pairs, of varying shapes, some being oblong (plate xv., fig. 13), others long (plate xiv., fig. 11). The lower valves are strongly costate, broadly ribbed ; upper valves marked with strong growth-lines, margins approximate plain, showing closely appressed laminations, coloured on the edges by a reddish or purple tinge, a feature very unusual on the East Coast.

I have obtained it from the Dovercourt marshes, from mediæval buildings at Ipswich, and Sir James Smith added others to the Linnean Collection in 1770 from similar dwellings in Norwich. Length of oblong type figured 80 mm., breadth 100 mm., of longer shell length 130 mm., breadth 110 mm.

The oblong form is extended beyond the confluent margin of the inhabited portion of the shell by a superfluous growth of shelly matter.

OSTREA FOULNESSII *sp. nov.*

The only other tinted shells I know of on the Eastern coast came to me from Foulness Point, on the Essex coast. These shells are native to the ground they occur on, and are mostly adherent to the rock by the greater part of the under valve, which hides the sculpture on the specimen figured (plate xv., fig. 14). This is seen to be rather more closely ribbed than usual. The shells are not large, and are very variable in their outline, due to their environment ; valves usually compressed the fluting or folds tinged purple or pink ; the margins of the valves touching each other. My largest specimen is about 100 mm. long, by 50 mm. broad.

The most plentiful of the Selsey oysters are of the lamellose type (plate xv., figs. 15 and 16), but there are others which vary from these considerably in their outline and structure, being long subtrigonal with well-marked umbones showing traces of former attachments. In two of these the costæ are fine and delicately imbricated, the largest being 120 mm. long, the other being a coarser build and with broader ribs and with concentric growth marks. I do not know any living shells to

collate with them unless it may be the small Helston shells referred to below.

Some shells kindly sent me by the Manager of the Helston River Fishery, Falmouth, seem to be very distinct from the ordinary run of South Coast oysters, and may belong to the Selsey group. They have the laminae looser on the top valve, this being sunk into the lower shell, which is strongly ribbed for its size ; inside discoloured, margins pink to purple.

OSTREA DEVONENSIS *sp. nov.*

The most beautiful of the British oysters is perhaps the one described by Montagu (*Test. Britt.* 1803, p. 152) as coming from Salcombe Bay, Devon (plate xvi., fig. 20) having a very thin shell, rather shallow, with large membranaceous plates, wrinkled with irregular interrupted ribs. The upper valve is flat, or rather concave on the top, with a corneous margin, half an inch broad, extremely thin and brittle ; the lower valve convex, clouded with pale purple, particularly round the margin. Shells taken from different parts of the bay vary so much that they appear like different species. The corneous imbricated lamellar plates of the upper valve here referred to are broad, elevated and obscurely folded, and like the lower valve more or less tinted with violet or purplish red. The latter is traversed by radiated folds or ribs, often vaulted, where the concentric growths are raised (Turton, *Conchylia Insularum Britannicarum*, 1822).

Turton describes it as roundish oval, with scaly foliations, the upper valve less and flattened, and the inner margin very entire. The shell which Montagu described is apparently the one to which Turton refers when he says "the shell is very irregular, sometimes growing to a large size, when the beak of the under-valve becomes much elongated and transversely striate in the ligamentous cavity."

OSTREA MONTAGUI *sp. nov.*

The difference between the two forms recognized by Col. Montagu, specimens of both of which I possess, may be briefly stated. The one has thin walls, with finely ornamented and foliated under-valves, and a greater development of the horny plates ; the other is a stouter, more rugged texture, the costal ribs are more strongly defined, and the laminae more closely

PUBLICATIONS of the ESSEX FIELD CLUB.

The specially-valuable feature of the Publications of the Club is that they are almost wholly local in character. The volumes (comprising over 6,000 pages) contain hundreds of papers on the Natural History, Geology, and Pre-historic Archæology of Essex. The articles are of the greatest interest to all persons having any regard for the County, and the scientific accuracy and detail of a large proportion of them make them of value also to students of the subjects named living elsewhere.

The publications are all of demy octavo size. Nearly all contain numerous illustrations, in addition to plates. All are still in print, but some are becoming *very rare*.

“ TRANSACTIONS ” and “ PROCEEDINGS ” (in parts).

This series, which ran from 1881 to 1886, is no longer published, having been superseded by the *Essex Naturalist* (see below).

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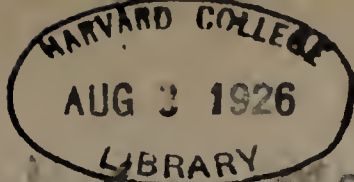
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Vol. XIX.—Part IV.]

[OCT. 1920—MARCH 1921.]

The
Essex Naturalist:

BEING THE JOURNAL OF THE
ESSEX FIELD CLUB.

EDITED BY PERCY THOMPSON, F.L.S., *Honorary Secretary,*
assisted by
HENRY WHITEHEAD, B.Sc.

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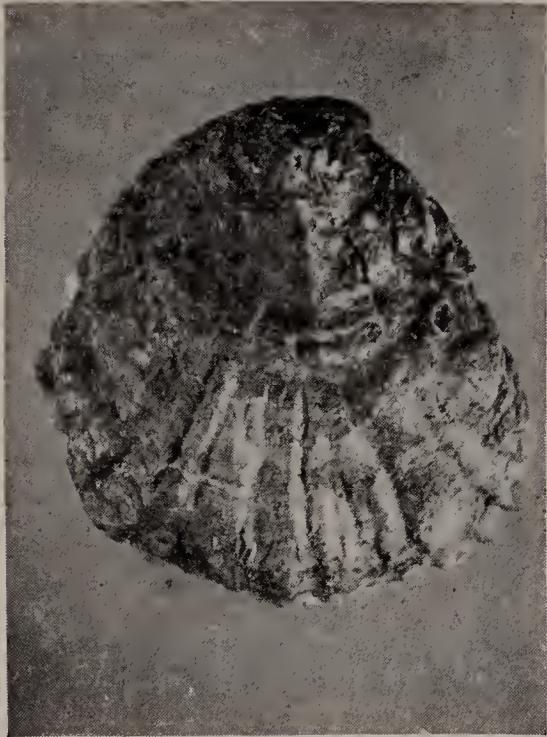


FIG. 17.



FIG. 18.

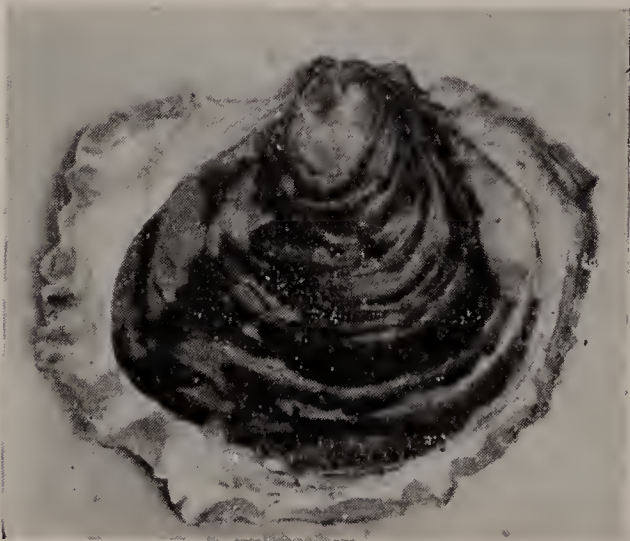


FIG. 19.

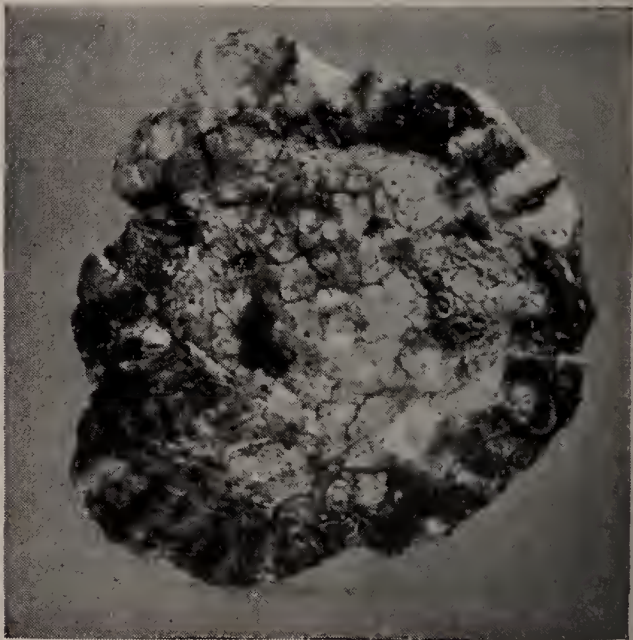


FIG. 20.

appressed. My largest example measures, length 130 mm., breadth 140 mm.; my smallest (plate xvi., fig. 18), 3 by $2\frac{3}{4}$ inches, the lower valve expanding at the shoulders to $3\frac{1}{2}$ inches.

Many of these Western forms attain a great size, height $5\frac{1}{2}$ to 6 inches, breadth $4\frac{1}{2}$ inches, and are round and solid; the ribs or folds on the lower valve being narrow to moderately broad, so that, when the concentric laminae are raised, as they usually are, the interrupted ribs become vaulted or fimbriated, especially so in Jersey shells. The corneous plates in the upper valve are broadly laminate, and extend considerably beyond the margins of the valves.

Da Costa's notice of the growth of the lamellar horny plates is very clear and may be quoted here (*British Conchology*, 1778), as it so exactly describes the ornament and growth of the Western oyster. "Usually about 3 inches long, and less in breadth, the shells vary in size and shape from their adhesion to other bodies in different places.

"The upper or flat valve is of a dirty brownish hue, roughly plated or made up of transverse flakes exceedingly thin. These lie close, compact and strongly set together on the upper part, well towards the middle of the shell, from thence to the bottom they are more loosely set, become finer and thinner, and more extended beyond one another. As they approach the lower margin they are generally so loose, separate and extended, as to foliate the shell very finely, even much beyond the edges of it.

"The under valve is very rugged, whitish or generally greenish; the leafed structure seldom shows such fine foliations as the upper valve; these are chiefly apparent on the edges of the wrinkles that cross the shell, which they furbelow or plait. These are commonly of a purplish colour; the valves wrought with several irregular, prominent, longitudinal ribs."

Forbes and Hanley (*Brit. Moll.* ii., p. 307, pl. liv.) notice the "dissimilarity of aspect between the sleek looking valves of the flattened native oyster of our markets, and the more coarse (!) and rugged, but far more beautifully sculptured and coloured, solitary individuals which are ordinarily termed rock oysters." The shell figured by these writers is very different from that of Jeffreys (*op. cit.*, fig. 1), and represents a shell not very common in the cabinets of collectors. Their description reads like an

enlarged edition of Montagu's rock oyster, and probably represents the same form. "The upper valve is beautifully radiated with lines and streaks of dull purplish crimson, or reddish-chocolate, and the concentric lamellæ, instead of being closely appressed, are extremely thin, usually composed of rather large plates, more or less elevated, overlapping each other. The ribs or radiating folds of the lower valve are less numerous, and mostly narrow or but moderately broad, sometimes stained with a rich purplish red towards the margin."

Reeve also figures a handsome shell referable to this form as *O. edulis*, but like Forbes and Hanley does not give any locality.

OSTREA SAXATILIS Turton.

"Shell very thin, pellucid, a little scaly, the larger valve with strong longitudinal ribs which often end in hollow scales. Shell two to three inches long, variously shaped but generally suborbicular, oblong or sub-triangular, mostly with a fine purplish tinge." (*Bivalve Shells of the British Islands*, 1822.) Found adhering to rocks and stones near low-water mark at the Mumbles near Swansea.

I have copied Turton's description, not having had the opportunity of seeing the shell referred to as yet, as it seems to be scarce at Swansea. The description, "very thin and pellucid," separates it from any form I know unless it is the one here figured (plate xvi., fig. 19), with which I am disposed to collate it, but with some reserve, my shell not being so pellucid as is described by Turton. This may be only another local form (Tenby), but sufficiently pronounced in features to make it easily separable from other members of the same group, and it seems peculiar to this part of the Bristol Channel. The valves are suborbicular and unequal, more so than in others in this group, as the laminae in none of the examples I have seen, whether 2 or 4 inches across, old or young, seem to have these projecting beyond the edges of the valves. Those on the upper valve are very closely flattened, not rising above the level. The costæ on the lower valve are undulate, broad, and irregular in size and disposition, the lines of growth hardly showing in the smaller shells, showing more as the shell grows, where the costæ become fimbriated. In the *scæva* form these are prominent, even in the smallest stages of growth.

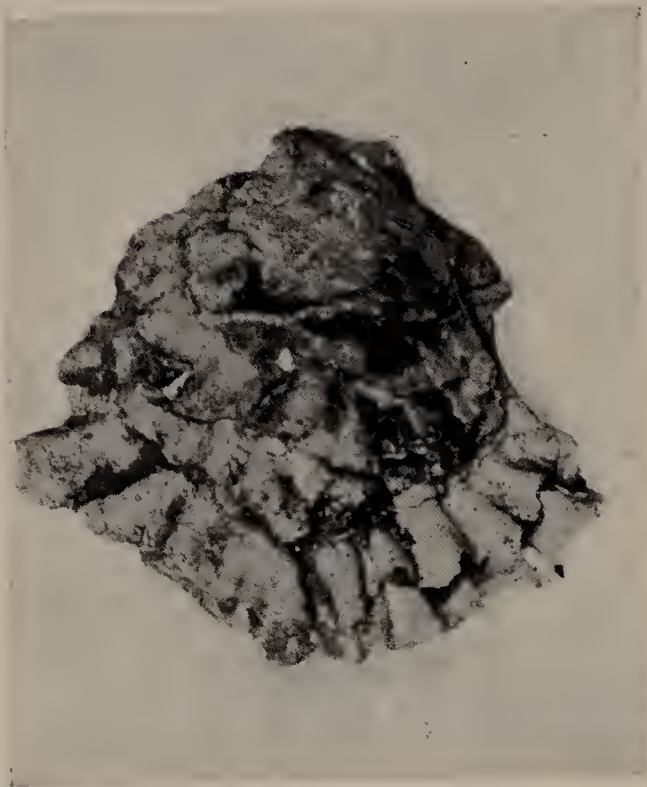


FIG. 21.



FIG. 22.



FIG. 23.



FIG. 24

The loss of the large horny plates causes the upper valve to sink into the lower, leaving exposed in a shell of 3 inches diameter a bare space of over $\frac{1}{2}$ inch all round. This hiatus is equally present whether the shell be one inch broad, or four. This habit of growth is common to many S. Western oysters, but hardly to the same extent. It may be an extreme variety of the next species, judging from some examples of the latter sent me by M. Ph. Dautzenberg recently.

OSTREA SCAEVA (Valenciennes MS.) Monterosato.

This beautiful shell is described by Miss A. L. Massy (*Fisheries of Ireland Scient. Invest.* No. 11, 1913), and is figured in all stages of growth on pp. 1-10, as *O. edulis*, var. b. Poli, and subsequent writers, have called it *O. cristata*, a name originally given by Born (*Mus. Caes. Vindob.* 1780, pl. xii., fig. 3) to a shell that cannot be identified, and by Lamarck to a Senegalese species *O. atlantica* (see *ante*). The lower valves are crossed by prominent lamellar growth produced into broad and deeply arched fimbriation. The upper valve is irregular, usually swollen towards the umbo, but mostly sinks into the lower valve at the margins; the horny lamellæ are long, irregular in outline and very conspicuous and foliated. The foliated edges often give the appearance of slight dentation. In nearly every instance the shells have been attached to some extent. The colour is at times a vivid pink, and striped at the top of the valve (plate xvii., fig. 21). The name being preoccupied, Monterosato revived the name *O. scaeva* in a Memoir on Mediterranean oysters (*Ann. del Museo Civico*, vol. vii., plate 1, fig. 1-3, p. 3), and the authors of the Roussillon memoir figure it as *O. edulis* var. *cristata* (vol. ii., figs. 1 and 2). I have not met with it in the English Channel, and only doubtfully as a Selsey fossil. As a recent shell it is known from Bohuslar to the western Mediterranean, via Galway and Jersey, but does not come farther east in Britain than Devonshire. A full-grown specimen averages length $2\frac{1}{2}$ inches, breadth 3 inches. Miss Massy (*op. cit.*) figures some fine Norwegian examples, quoting one as being 105 mm. from hinge to ventral edge.

OSTREA STENTINA, Payraudeau.

Prof. Kerr, of Glasgow University, has kindly sent me a number of oysters from Loch Sween, Argyleshire, quite unlike

any others I have knowledge of in Northern or British waters ; they are mostly attached to splinters of rock, tiles, or other culch, and vary much in shape and contour, probably arising from the size and place of the original attachment at the place of growth. Free examples measure on an average height 60 mm., breadth 50 mm. My largest is 80 by 75 mm. (plate xvii., fig. 23). Sculpture of lower valves strongly costate, the concentric lamellæ in the free shell rising into tubular ridges on the costæ, a feature not so well displayed in the rounder and more attached shells. The inside has a moderate ligamental area, narrower and deeper than in the ordinary *edulis* type of the East coast, and more pointed. The margins are very marked, and deeply indented.

The upper valve is covered with broad horny plates, sometimes extended beyond the edge, which on breaking away leaves a broad margin to the lower valve, which is often coloured a deep purple. Unlike most of our oysters the upper valve is convex rather than flat. The strong ridges or ribs traverse the back from umbo to edge, which is largely dentate, the undervalue in all cases overlapping the upper shell.

Mr. le B. Tomlin, to whom I submitted some specimens, suggested a reference to the figure of *Ostrea stentina* in the *Moll. Mar. du Roussillon*, pl. vi., figs 1-6, and except that the dimensions of the Scotch shells are greatly in excess of the French ones, and also of those of a specimen I have from the Bay of Naples, I cannot find any great divergence between the two. Lamarck's description applies to our shell, but he gives no dimensions. Carus says 80 mm., which agrees with the measurement of the Scotch form. According to the Marchese di Monterosato, *O. obesa* Sow. figured by Reeve *op. cit.* pl. xxxiii. (who does not mention *O. stentina*) is the same as *O. stentina* Payr ; the descriptions given by Reeve and the Roussillon authors agree with our shell. The last named writers especially notice the flatness or slight convexity of the upper valve, which is nearly always eroded—a very definite feature in those from Loch Sween.

F. Buckland remarks that the Western Scottish Oysters were quite different from those of the East English coast, the beard being always black. Had he this group in mind ?

Like all the Mediterranean *Ostreas*, the synonymy of *O. stentina* is very involved. Philippi and Pantanelli refer it to the *O. plicatula* Brocchi. The authors of the Roussillon memoir

make it a living French oyster. Locard (*Prodrome* 1886, p. 578) mentions *O. obesa* as a French species which is later on given by him as a synonym of *O. stentina*.

OSTREA CANVEYENSIS, *sp. nov.*

Mr. Spurrell (*Arch. Journ.*, vol. xlii., p. 1885), referring to the quantities of oysters on the margin of the Thames Estuary, mentions a shell bank on the eastern spit of Canvey Island. A small series which I have had sent me from that locality exhibit certain features which ally them to the small Mexican shell *O. mexicana*, Sav. (Reeve *op. cit.*, pl. xvi.), with which, fig. 35, they have much in common, and in less degree to the hollow-beaked *Ostrea cucullata* group. The shells are small, as if stunted, full grown, and very irregular in outline, and are all more or less attached by the under valve, which is the longest and, so far as exposed, coarsely corrugated. Upper valve flat or slightly ovate, beaks prominent, hollowed under hinge. Colour dead white striped with purple, margins deeply dentellated and coloured. My largest example measures length 75 mm. by breadth 50 mm. A solitary example that I obtained from Foulness measured 95 mm. by 70 mm. The interior is white with a coloured scar (plate xvii., fig. 24).

OSTREA ADRIATICA Lamarck.

My attention was called many years ago by Messrs. Etheridge and Bennie to a marine deposit at Cocklemill Burn, on the shores of Largo Bay, in Fife (for details see "Marine Accumulation Largo Bay, &c.," *Proc. Roy. Phys. Soc., Edinburgh*, 1890, 1893), which has yielded, besides other organisms, 155 species of shells. 13% of these are not known as inhabitants of the recent Firth of Forth. Since then I obtained at Mr. Damon's sale, amongst others, a group of oysters of very irregular shape and proportion as compared with any other known in these islands, including the name shell *O. adriatica* as figured in the *Moll. du Roussillon*, pl. ii., figs 5 and 6, and its varieties *alata* and *falcata* both figured by Monterosato, *op. cit.*, pl. ii., figs. 1-4.

The Scotch shells are more or less corrugated and the surface is very irregular. The upper valve is plain, immediately following the contour of the under valve, but leaving a deep breadth of margin strongly crenulate at the hinge area. Apex acute,

inclining to the left ; ligamental area curved, deep and narrow. It varies in contour from ovate or subtrigonal to a nearly diamond shape. The costæ vary from close set bifurcations to wide and almost imperceptible swellings. Height of full-grown shell 70 mm., breadth 65 mm., but no two are alike in their proportions. Some of the shells are much produced on one side, and the lamellæ are at times considerably expanded and all seem to have been attached at one time.

The Holmes collection in the Norwich Castle Museum contains three species (four examples) of Corsican oysters, reported as from Caldy Island and Tenby, but possibly wrongly localized, *i.e.*, *O. cyrnusi*, *O. cochlear*, and *O. Dianæ* (*O. boblayi*, B.D. & D.). When this fine collection was being built up some fifty years ago, a Corsican, M. Jean Susini, mentioned by Jeffreys, was constantly receiving small parcels of shells from the Island to dispose of, and I think it probable that the above shells may have been admitted into the collection in error, as being rare or beautiful specimens. *O. cochlear* has been dredged in 110 fathoms 40 miles off Valentia in West Ireland (*Proc. Zool. Soc.*, 1879, p. 555).

OSTREA CYRNUSI, Payraudeau.

Payraudeau gives two figures of his species, one with a deep under valve, the other with it nearly flat, as is my own Corsican shell. Requier has made two varieties of Payraudeau's species, calling his fig. 1 *O. obtusa*, fig. 2 *O. rostrata*. The Holmes shells, the longest measuring 120 by 70 mm., belongs to the latter group of large, thick, ovate or oblong forms, with a moderately long beak.

Messrs. Bucquoy, Dautzenberg and Dollfus regard it as a simple sub-variety of *Ostrea lamellosa*, only differing in its straight form and prolonged beak. Carus and Fontannes make it the same. H. and A. Adams and Monterosato deal with it as a separate species. Cerulli-Irelli figures a shell under this name (*Palæont, Ital.*, vol. xiii., plate iii., fig. 4), as a var. of *O. edulis*, but the whole group of which the shell figured by the latter may be taken as a type is one in which any rhomboidal, plain-margined, non-costate oyster may find a resting place. The species is a very unsatisfactory one in itself. *O. cyrnusi* may perhaps be better considered as representing a group of allied forms rather than as a distinct species.

OSTREA COCHLEAR Poli.

Reeve (*Conch. Icon*, plate xx., fig. 44, a., b.), describes this shell as "very thin, ovate or suborbicular, foliaceous; lower valve very deep."—"Upper valve compressed, with the margin reflected, radiately striated at the margin." The species is very irregular in shape, varying from nearly flat specimens, to others with deep lower valves, as in var. *navicularis* Brocchi. Nearly all examples exhibit the foliations or callosities, caused by a surplus of shelly matter. The shell from the Holmes Collection exhibits this very strongly. *O. cochlear* is fairly common in the East Anglian Crag. The *O. spectrum* Leathes (*Crag Moll.*, vol. ii., plate II., fig., 1 c.) is a variety that shows the foliations to perfection.

OSTREA DIANÆ Monterosato.

This beautiful shell is exceedingly delicate, squarely built, with oblique, projecting beak-like umbo, but with the ligamental area narrow and deep in proportion to the length; the granulations of the hinge well marked, scar deep, interior lining opalescent, margin plain. Outside irregular, with close narrow ribbing, colour reddish purple, with closely set laminations on the upper valve. Height 55 mm., breadth 35 mm. The shell is not unlike a full grown Mediterranean example of *O. stentina* which I possess, but this, although only two-thirds of the size, is stronger ribbed, less nacreous, and has a different muscle mark, with a crenulated edge. The authors of the *Moll. du Roussillon*, vol. ii., plate xiv., figs. 1-5, correlated a Corsican shell with a Miocene species *O. boblayi*, Deshayes. It does not agree with Deshayes' species, and has been re-named *O. Dianæ* by Monterosato (*op. cit.*, p. 4).

OSTREA VIRGINICA Gmelin.

Attempts have been made to naturalize the American oyster in British waters, but without success, the general temperature of the water being too low for successful propagation either by sowing the spat or by laying down shells of a more advanced growth, such as were dredged up (dead) by Canon Norman in Salcombe Bay, Devonshire. On the East coast of England this operation has enriched our native fauna with several shells, as for example *Petricola pholadiformis*, *Crepidula fornicata* and

C. convexa Say, or an allied form, which have taken root and flourish abundantly. The shells laid down were the medium-sized "blue points" figured by Chemnitz, t. 73, no. 577.

Early writers extended the living range of this species to Europe, and even to the Indian Ocean (Linné), several *O. virginica* European forms being included in it, but the true *O. virginica* has not been found outside the N.E. United States and Canada. It is the *O. rostrata* of early conchologists.

The *Ostrea borealis* described by Lamarck (*An. sans. Vert.* vii., 220), is the earlier growth of the above, and Reeve (*op. cit.*, plate vi., fig. 9), figures a specimen having some resemblances to our close-pressed *Ostrea edulis*. Gould (*Invert. Mass.*, p. 203), enters it in his list of shells, but doubts its specific value, as does Dr. Dall, who says "there are certainly forms in which the American and European forms could not be distinguished." Jeffreys seems to have been of the same opinion.

OSTREA ANGULATA ERTHENSIS, var. nov.

Lamarck's name *Gryphaea angulata* (*Anim. sans. Vert.*, vol. vii., p. 203), has been extended by many writers to cover the irregularly shaped oysters (the Anglo-Portuguese shell of our markets), characterized by the strong carinated ridges extending from the umbo to the ventral edge. The mollusc is not a British species, nor does it occur fossil in this country, unless the shell referred to as *O. plicatula* in the report on the St. Erth deposit (*Trans. R. Geol. Soc., Cornwall*, 1897, vol. xii., p. 154), is, as I am inclined to think, a member of this variable group (plate xviii., fig. 26). Our shell is strongly carinated and hollowed under the cartilage pit, and the umbo is camerated within. It may be the *O. plicata* of Chemnitz, and *O. plicatula* of Gmelin, which Lamarck says inhabits the "seas of America and the Indies, fixed to rocks and corals," and which Chemnitz says is American or Mediterranean, varying very much in shape and size, but generally cavernous, with a mixture of violet, sometimes white with a bluish tint. Gmelin's name is now used for an Asiatic shell (see Reeve, *Conch. Icon*). Eyton (*op. cit.*) says the Portuguese oyster buries itself in muddy sand with the hinge downwards, and was informed that the American *O. virginica* in the Chesapeake River had the same habit. Brooks (*The Oyster*, Baltimore, 1891) says this is due to overcrowding the hard ground so closely that

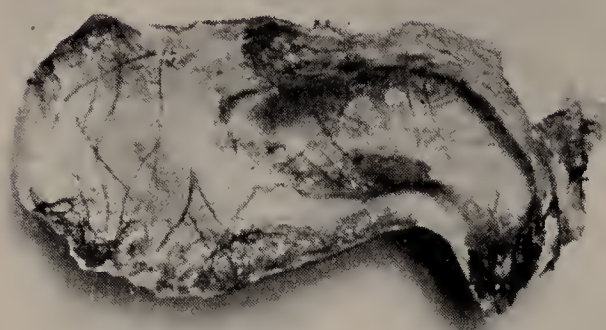


FIG. 25.

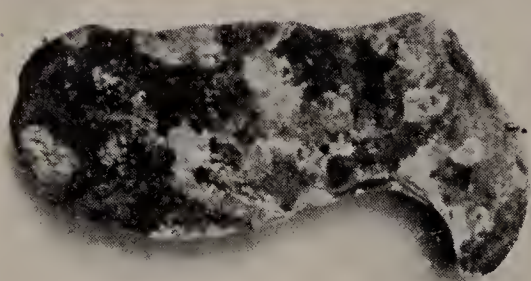


FIG. 26.



FIG. 27.



FIG. 28

they cannot lie flat, but grow vertically upwards side by side. Hidalgo gives its habitat as Corunna and the Tagus, with a littoral habitat. Attempts to naturalise it in British waters have not been very successful or productive.

These may all be referred to the section *Crassisostrea*, Sacco, a group which discharge their eggs into the sea water, unlike our British shells, which retain the fry in their gills. (Dr. Dall, *in litt.*)

OSTREA LUSITANICA, A. Bell.

Under this name I figured (*Rept. Yorks. Phil. Soc.*, 1892, p. 73, pl. i., fig. 1), a shell I found occasionally in the early Pleistocene mud deposit at Selsey in Sussex, where it occurred with 215 other species of molluscs, all of Lusitanian types. The shell is long and narrow in proportion, ranging up to 100 mm. by 45 mm.

On p. 197 reference is made to a small elongated shell ascribed by Jeffreys to *O. deformis* Lamarck, which I showed did not agree with the author's description in any way. Reeve's figure (*op. cit.*, plate v., fig. 8, d.), closely resembles this shell and both may be assigned to the present species.

OSTREA VERTEX, *sp. nov.*

Sir Gardner Wilkinson (*Zoologist*, 1865, vol. xxiii., p. 9559), describes finding at Tenby a small oyster with depressed end, only 2 inches long, by five-eighths of an inch in breadth, scarcely varying in width throughout its length. His description is that of a young shell having the "half deck" prolonged into a tail-like projection or spur, terminating in a sharp point corresponding with the hinge area and which in my own full grown example is much larger. This shell may be described as long, narrow, thin; upper valve slightly convex, lower flatly convex to hollow or channelled longways; beak and ligamental pit long, narrow, and usually produced as a spur. Scar purplish, hinge granulations indistinct. Length 70 mm., spur 15 mm., breadth 45 mm. Colour cream yellow, thin outer skin, margin plain, surfaces smooth. One of the largest dealers in S. Wales tells me that this form is only met with at times, and one of his men to whom he showed my sketch at once recognized it as a local shell, not often met with. The name *vertex* refers to the projecting spur. (Plate xviii., fig. 25.)

A similar shell is described by M. M. Bucquoy, Dautzenberg and Dollfus (*Moll. Mar. du Roussillon*, v. ii., p. 23, pl. V., fig. 7, 8, 9), as *O. stentina* var. *pepratxil*, and an odd valve from Tripolitana is described by Monterosato. The British shell is rather variable, and may be the same, but I have no means of comparing the two.

OSTREA ROSTRALIS (*in Reeve*).

Reeve (*op. cit.*, pl. x., fig. 20), describes this shell as oblong, rugged, upper valve lamellate, the other excavated and longitudinally grooved, beak prominent, Hab. Mediterranean. The British Museum specimens and my own are from Portugal (Tagus region).

This shell is elongated and irregular, undulated, striped and variegated brown and purple on a whitish ground. Beak acuminate, narrow and produced, under valve overlapping the upper one. The apex is normal and not undercut as in *O. angulata*; interior usually a chalky white, exterior of lower valve smooth, and ivory white in colour. The York Museum has a very fine upper valve of this type (plate xviii., fig. 28), obtained by myself from the Lusitanian deposit at Selsey in Sussex, but as the figure shows, it is rather more ovate than the usual run of Portuguese examples, and may represent another or allied species. Sir Gardner Wilkinson, in a note on *Ostrea virginica* (*Zoologist*, 1865, vol xxiii, p. 9558,), says he found that shell at Tenby, where he was residing, naming it specifically the *Ostrea virginica* of Spain, he having collected it at Cadiz. His largest Tenby specimen was $5\frac{1}{2}$ inches long, $3\frac{3}{4}$ inches at its widest part, and $1\frac{3}{4}$ inches deep. He remarks further that the beak, and with it the hinge, in a full grown Spanish shell frequently become depressed or bent downwards. This feature does not appear in the Selsey shell. It can hardly be termed a specific character as the same aberration of the apex appears in others of the long oyster type (p. 191).

I have obtained from the Thatcher Rock and Hope's Nose, Torbay, a number of specimens that appear to correspond with Wilkinson's shell; the one figured (pl. xviii., fig. 27) from the Thatcher is thick, flat, with a length of 105 mm. and breadth of 65 mm.

Since the foregoing was set up, I have received from W. L. Calderwood, Esq., F.R.S.E., of the Fishery Board for Scotland, a number of examples of the older types of oyster once common in West Scotland, and much valuable information. The specimens sent me are from Jura and Loch Don in Mull, and are all dead shells, and they clearly bring out that the form, which I have called *O. celtica*, was the ancestral and predominant oyster of these seas, the elongated outline gradually becoming rounder as it passed southwards. The Jura shells are more disintegrated internally than are those from Mull, which have the nacreous lining preserved unbroken and lustrous. The existence of these shells in Loch Don seems to have been unnoticed till discovered by Mr. Calderwood, who found in the neighbourhood a series of stumps of branches of trees roughly pointed at the ends. As Mr. Calderwood found some of the shells attached to the stumps, they may be, to use Mr. Calderwood's words, "regarded as collectors to catch spat, as the Japanese use Bamboo" to-day.

Both in Jura and in Mull, other forms occur, but not so abundantly as do the *Celtica* group. Amongst those from Mull is a very fine example of the thick massive dark-coloured form of the *Estuarii* group, like those mentioned above (p. 204), from Grangemouth, Micklewood and the Nar Valley, which cannot be differentiated from a Dogger Bank shell in my collection, all being of the *hippopus* habit.

A few of the Mull shells both in size and ornament are not unlike one of the shells figured by the authors of the *Mollusques Marines du Roussillon* from Cancale, N.W. France (pl. i., fig. 4). They are more recent than the shells I have referred to above.

The attempts hitherto made to repopulate the oyster beds of W. Scotland do not appear to have been very successful, whether in Shetland, or farther south, as at Arisaig in South Invernesshire, where stock from Colchester, in Essex, was laid down, or at Loch Sween, Argyleshire, where a large consignment from Arcachon, S. of Bordeaux, was utilised. Probably in these latter instances the climate was too strong for the strains selected. The Loch Sween shell figured (pl. xvii., fig. 23), may have been introduced with the Arcachon shells.

The most recent of the Mull and Jura shells are of the "Pandoure type" (plate xiii., fig. 6), and appear to be of no great age from their condition, a portion of the adductor muscle still

remaining in the shell of one of the valves. This is the largest member of the *Rutupinian* group, and seems to be confined to Scotland and N.E. Britain, but not exclusively to this area.

The *tincta* variety (pl. xii., fig. 4), I gather from Mr. Calderwood's notes and specimens, abounds not only in the Sound of Scalpa, but also in Skye and on the west coast of Mull (Loch na Keal). With him I think they belong to the *Rutupina* group of the south-east of England, with which they agree in size and shape, mainly differing in the internal colouring. This, however, may be a local peculiarity as I have noticed it in other western shells, and in all these localities the immature shells are ovate, the anterior margin becoming pointed in later life.

I have not as yet found any intervening locality for this type between the Eastern Counties of England and the Western Isles. Its presence in a Pleistocene deposit at March is a strong point in favour of the antiquity of the type.

I have lately found in some Roman debris sent me by Mr. S. H. Warren, two or three examples of the *O. cantii* referred to in p. 206 (*ante.*)

ERRATUM.—Will readers kindly transfer the ascription on p. 205 of pl. xvi., fig. 17, from *O. tenbiensis* to the Helston shell referred to on p. 208 to which it properly belongs ?

EXPLANATION OF PLATES.

PLATE XII.	Fig. 1.	<i>Ostrea edulis</i> var. <i>celtica</i>	Oransay
	Fig. 2.	„ <i>edulis</i> (typica)	River Deben
	Fig. 3.	„ <i>edulis</i> var. <i>hippopus</i>	Hartlepool Docks
	Fig. 4.	„ <i>edulis</i> var. <i>tincta</i>	Scalpa
PLATE XIII.	Fig. 5.	<i>O. edulis</i> var. <i>rutupina</i>	Felixstowe
	Fig. 6.	<i>O. edulis</i> var. <i>rutupina</i>	Forth Estuary
	Fig. 7.	<i>O. edulis</i> var. <i>rutupina</i>	March
	Fig. 8.	<i>O. edulis</i> var. <i>celtica</i>	Shetland
PLATE XIV.	Fig. 9.	<i>O. edulis</i> , var. <i>celtica</i>	Ramsey, I. of Man
	Fig. 10.	<i>O. edulis</i> var. <i>estuarii</i>	Lough Larne
	Fig. 11.	<i>O. cantii</i>	Herne Bay
	Fig. 12.	<i>O. ed.</i> var. <i>estuarii</i> (interior)	Lough Larne
PLATE XV.	Fig. 13.	<i>O. cantii</i>	Herne Bay
	Fig. 14.	<i>O. Foulnessii</i>	Foulness, Essex
	Fig. 15.	<i>O. sp.</i>	Selsey
	Fig. 16.	<i>O. sp.</i>	Selsey

PLATE XVI.	Fig. 17.	O. sp.	Falmouth
	Fig. 18.	O. Montagui	Teignmouth
	Fig. 19.	O. saxatilis	Tenby
	Fig. 20.	O. Devonensis	Teignmouth
PLATE XVII.	Fig. 21.	O. scaeva	Galway
	Fig. 22.	O. sp.	Carlingford Bay
	Fig. 23.	O. stentina	Loch Sween
	Fig. 24.	O. canveyensis	Foulness
PLATE XVIII.	Fig. 25.	O. vertex	Tenby
	Fig. 26.	O. angulata var. Erthensis	St. Erth, Cornwall
	Fig. 27.	O. sp.	Thatcher Rock, Tor- bay
	Fig. 28.	O. rostralis	Selsey

NOTE.—Specimens of most of the forms referred to above have been deposited by me in the Essex Museum of Natural History at Stratford.

ON ANOTHER ANNOTATED COPY OF WARNER'S "PLANTAE WOODFORDIENSES."

BY PERCY THOMPSON, F.L.S.

(With Two Plates.)

[Read 27th November, 1920.]

AT the Meeting held on 29th October, 1919, I had the pleasure to read before the Club a paper on a copy of Richard Warner's *Plantae Woodfordienses*,¹ which, as I hope I proved, contained numerous manuscript annotations made by Benjamin Meggot Forster, a member of a well-known family of Walthamstow botanists whose biographies I sketched in outline.

At the Meeting, Professor G. S. Boulger exhibited another and similar copy of the *Plantae*² belonging to Dr. B. Daydon Jackson, the amiable General Secretary of the Linnean Society, which copy likewise contained manuscript annotations, these being the work of Benjamin's more famous brother, Edward Forster, whose autograph appears on the flyleaf.

Dr. Daydon Jackson was good enough to suggest that I should "write up" his copy of Warner's book in the same way as I had the copy belonging to Mr. Holdsworth, and offered to entrust

1. ESSEX NATURALIST, xix., p. 72.

2. *ibid.*, p. 175.

the book to me for that purpose : and the present paper is the outcome of that suggestion.

The book is an 8vo. volume, bound in quarter buff calf with marbled paper sides, and is interleaved with hand-made blank sheets throughout : the water mark of these blank sheets is a G.R. below a crowned device of fantastic design, and its date of manufacture is clearly prior to 1784.

It was acquired by purchase by its present owner, who has methodically noted in the flyleaf : " Purchased by me this day of E. and J. Irvine for 2s. 6d. March 19th, 1874, B. D. Jackson."

The title page also bears the dated autograph signature,
" B. Daydon Jackson, 1874."

On the fly-leaf is the autograph of the original possessor
" Edward Forster, junr./
1784/"

which implies that he, like his brother Benjamin (and probably, as Professor Boulger has shrewdly hinted,³ like his other brother, Thomas Furlly Forster), had his copy of " Warner " bound and interleaved for his own use, immediately upon the publication of Thomas's *Additions* of that year, 1784.

The volume contains the " Index of the English Names," the " Errata " (but not the " Index of the Latin Names as given by Linnæus ") and also the *Additions* of 1784 due to T. F. Forster. The missing " Index of the Latin Names " has been supplied by the annotator himself, in manuscript, at the end of the book, not improbably from his brother Benjamin's more perfect copy : at the same time he has added to the Index the plants enumerated in the *Additions* of 1784, those included in Warner's MS. *Additions* in the copy of the *Plantae* in Wadham College Library, and also those added by himself in the annotations.

In comparing the annotations contained in the present volume with those made by Benjamin Meggot Forster in his copy of the work, one is struck by the fact that the records made by Edward Forster cover a much greater extent of country than do those of his brother Benjamin, and go to prove the wider range of his observations as compared with his stay-at-home brother. Purely local Walthamstow records are fewer, while, notwithstanding the

36 PLANTÆ

+ LIGUSTRUM Rati Syn. 465.

LIGUSTRUM [vulgare] Hudsoni Fl. 3. 113.
Classis Linnei Diandrya Monogynia.

Privet, or Prim.

In woods and hedges: not uncommon.

It flowers in May.

LILIUM convallium. Rati Syn. 264.

+ CONVALLARIA [majalis] scapo nudo. Hud-
soni Fl. 126. Pl. 146

Classis Linnei Hexandria Monogynia.

Lily-convally, or May Lily.

On the shady parts of beeches, or in woods;

not common in these parts: but found opposite

High Beech, near The King's Oak, in plenty.

It flowers in May.

+ LINARIA Elatine diffa folio acuminato. Rati

Syn. 282.

ANTIRRHINUM [Elatine] foliis hastatis alternis,

caulibus procumbentibus, corollis calcaratis.

Hudsoni Fl. 237. Pl. 271.

Classis Linnei Didynamia Angiospermia.

Sharp-pointed Fluellin.

In corn fields: not uncommon.

It flowers in August or September.

LINA-

Linaria aquatica.

is common in High-land in Essex

and near the river of the Hammon (New

Belton) 1824 found by J. G. Griffiths 1822.

under a hedge on the left hand of the road from High-land
to High-land. between the road to the High-land and the
High-land some other side of the road to High-land of which
it is.

Linaria Elatine diffa folio subobtusiusculo.

Syn. 282

It is common in Essex.

is a fast growing plant and is common in Essex.

Another sort of *Linaria* is common in Essex.

is a fast growing plant and is common in Essex.

Great Pandon

title of Warner's book, fairly distant county localities are noted for certain plants, such as Warley Common, Rainham, Barking, Great Parndon, Latton, Stanford Rivers, etc., and the observation is occasionally made: "It is an Essex plant." This seems to indicate the intention which Edward Forster confessedly had of publishing a Flora of Essex. He wrote to Gibson in 1843, "Having, as I conceive, ample materials for a Flora of Essex, I have long thought of publishing one, and have actually begun to arrange it. . . . My first plan was to have printed only a second edition of Warner's *Plantae Woodfordienses*, but having enough for a county Flora, I have thought it best to extend it to all the known plants of Essex."⁴ However, this intention was never carried out.

Very few indeed of the entries made by Edward are dated: in this respect he falls far short of his brother Benjamin. One can only surmise, from the frequent diversity in the handwriting and the varying blackness of the ink used, that often long intervals of time elapsed between the earlier and the later records, even of an individual species. It is certain that some of the annotations were made directly after the volume was bound in 1784 (there are notes dated 1786 and 1792), whilst other notes are dated as late as 1840, 1843 and 1844.

Edward's free caligraphy is often difficult to decipher, especially in some of the later notes, which are merely scribbled: in one or two instances, but I think very few, this may have led to errors in transcribing the notes for the present paper.

It may be well here, at the risk of recapitulation, to give some biographical details concerning the annotator.

Edward Forster was the son of a rich city merchant, Edward Forster the elder, and on account of the identical Christian name was accustomed to sign himself "Edward Forster junr." as in the present volume. His father, the head partner of a prominent firm having its headquarters in Bond Court, Walbrook, and later at 38, Threadneedle Street, and later still at 6 St. Helen's Place, Bishopsgate, was for 23 years Governor of the Russia Company, and for over 20 years Governor of the Royal Exchange Assurance, also, for a time, head of the Mercer's Company, and Deputy-Governor to the London Docks.

Edward *filis* was born 12th October 1765 at Wood Street,

4. Quoted in G. S. Gibson's *Flora of Essex*, 1862, p. 453.

Walthamstow (where his parents had settled in the preceding year), it is believed in the still existing "Clock House," a spacious yellow-brick Georgian mansion with stable outbuildings, standing in once extensive grounds.

Edward became a partner in the banking firm of Forster Lubbock Bosanquets and Co.⁵, afterwards styled Forster Lubbocks Forster and Clarke, of 11 Mansion-house-street, E.C., which has developed into the well-known Robarts, Lubbock and Co., of which the late Lord Avebury (formerly Sir John Lubbock), was chief.

In 1796, Edward married: his wife, Mary Jane (b. 11 July 1763 d. 14 January 1845), was only daughter of one Abraham Greenwood, of whom I have been unable to learn any particulars.

His botanical tastes were of life-long duration. In boyhood he collected the local wild plants of his Walthamstow home in company with his two brothers, and the present volume bears evidence that his habit of noting and recording botanical finds persisted into old age.

He paid considerable attention to cryptogams, particularly lichens: a manuscript list of some 40 of these obscure plants, recorded by him from Epping Forest, is given in his inter-leaved copy of Turner and Dillwyn's *Botanist's Guide*, 1805.

Edward Forster was elected a Fellow of the Linnean Society in 1800, and was appointed Treasurer of the Society in 1816, and one of its Vice-Presidents in 1828. On 22 February 1821, he was elected F.R.S.

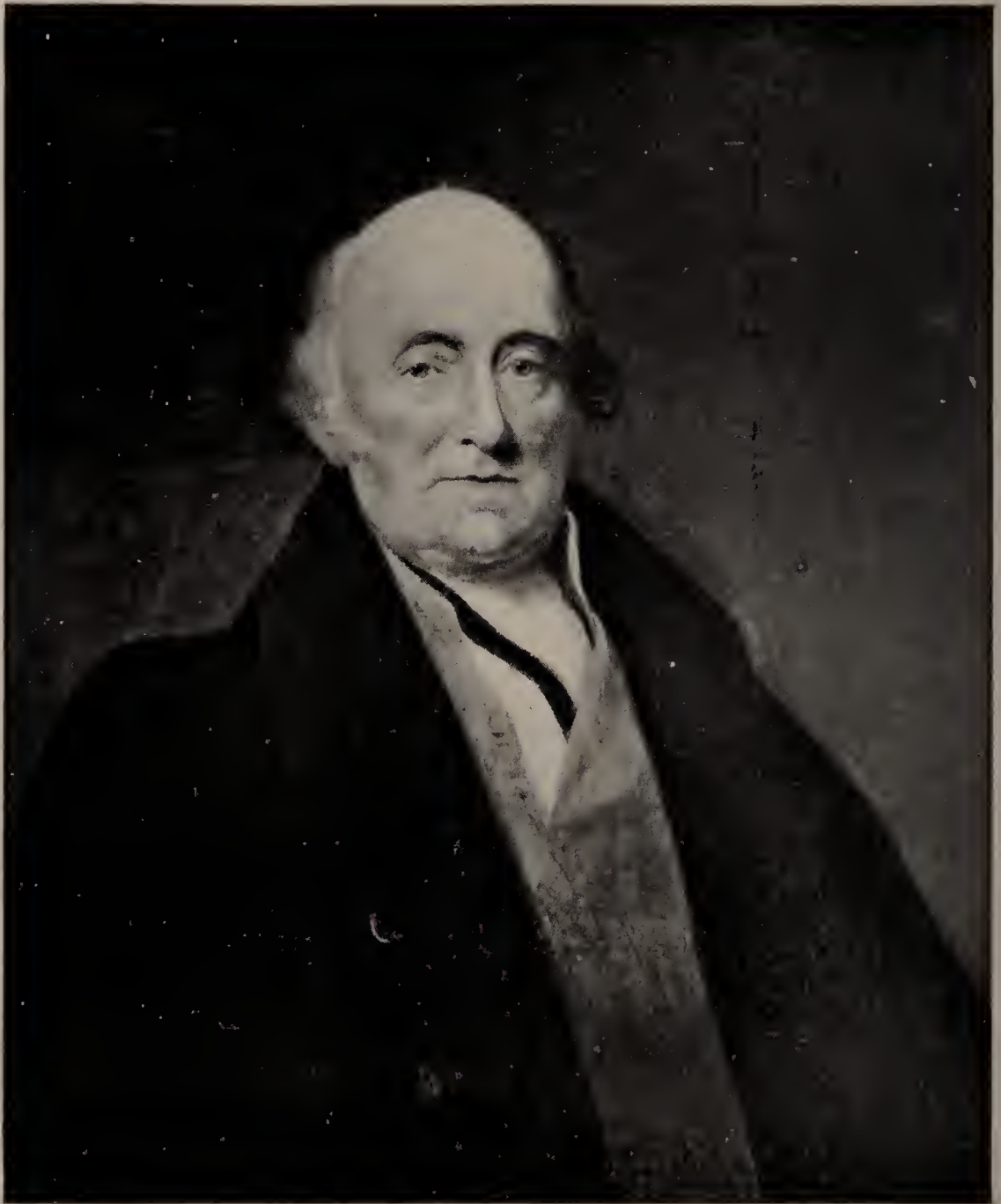
In 1848 he wrote for the Ray Society a short biographical notice of George Scott, F.R.S. (b. 1719 d. 1780), the antiquary, of Woolston Hall, Chigwell, nephew of Dr. William Derham of Upminster, and editor of his "Select Remains of the Learned John Ray" and also of "Mr. Ray's Itineraries," 1760.⁶

He died 23 February 1849, at Woodford, in his 84th year, of cholera, and lies buried in the family vault in St. Mary's Churchyard at Walthamstow, together with his wife and his brother Benjamin: but there is no inscription to his memory.

A subscription portrait in oils was painted by Eddis in 1836, and presented to the Linnean Society, in whose Meeting Room it

5. The Bosanquet family were lords of the manor of Low Hall, Walthamstow, from 1741 down to 1877, and resided at Forest House, Leyton. One of its members, William Bosanquet, founded the banking firm referred to.

6. *Correspondence of John Ray*, Appendix A., 1848, p. 481.



EDWARD FORSTER,
Vice-President and Treasurer of the Linnean Society
(From the subscription portrait by Eddis presented to the Linnean Society in 1836.)

hangs. I am permitted by the Council of the Society to publish the accompanying photograph of this portrait. (Plate XX.)

Forster has written on the blank interleaved pages a list of the "Manuscript Additions to the *Plantae Woodfordienses* written in Warner's Copy in Wadham College Library,"⁷ and in some cases has added (in brackets), his own observations. The List is as follows:—

ALCHEMILLA. *Raii Syn.* 158.

ALCHEMILLA [*vulgaris*] foliis lobatis *Hudsoni Fl.* 59. (2d. ed. 70.)

Cl : Lin : Tetrandria Monogynia.

Ladies Mantle.

In meadows and pastures : Found in the copse the South side of Mr. Warner's large meadow (probably planted there).

It flowers from June to August.

BACCHARIS monspeliensium *Raii Syn.* 179.

CONYZA [*squarrosa*] foliis lanceolatis acutis, caule annuo corymboso *Hud. Fl.* 314 (fol : lan : ac : caule herbaceo corymboso, calycibus squarrosis 2d. ed. 363).

Cl : Lin : Syngenesia Polygamia superflua.

Great Fleabane or Plowmans Spikenard.

Found in a lane which leads from Fair mead bottom to Chingford, and on the Forest near Mr. Warner's Gravel pit pond.

July.

BISTORTA major. *Raii Syn.* 147.

POLYGONUM [*Bistorta*] caule simplicissimo monostachyo foliis ovatis in petiolum decurrentibus. *Hudson's Fl.* 146. (2d. ed. 168.)

Classis Linnæi Octandria Trigynia.

The Greater Bistort or Snakeweed.

In the Copse S. side of Mr. Warner's large meadow and withinside of an inclosure round his pale pond (probably planted).

It flowers May or June.

CHENOPODIUM vulvaria. See p. 244.⁸

CRUCIATA. *Raii. Syn.* 223.

VALANTIA [*Cruciata*] floribus masculis quadrifidis, pedunculis diphyllis *Hudson's Fl.* 375 (ed. 2d. 441).

Cl. L. Polygamia Monœcia.

Crosswort or Mugweed.

Found under a hedge in Ribton lane near Mr. Warner's. Very uncommon.

It flowers in May or June.

FLOS Adonis. *Raii. Syn.* 251.

ADONIS [*annua*] floribus octopetalis, fructibus subcylindricis. *Hudson's Fl.* 209. [A. (*autumnalis*) 2d. ed. 439.]

7. Warner intended these additions to be included in a second edition of his *Plantæ Woodfordienses*, which, however, he did not live to publish; he died in 1775.

8. The reference is to page 244 of the *Additions* of 1784, where this species is recorded as "not uncommon" by Thos. Furly Forster. Edward Forster there adds the note, "this plant was found by Warner in Horn lane and the road near Chigwell to Chigwell Row. It is written in his copy of the *Pl. W. in Wadham College Library*."

Cl : *Lin* : Polyandria Polygynia.

Adonis Flower Red Maithes (Pheasant's eye, red Morocco).

Found on the forest the North side of Mr. Street's, Woodford (probably escaped from a garden).

It flowers June July.

GERANIUM batrachoides. *Raii*. Syn. 360.

G. [*pratense*] pedunculis bifloris, foliis subpeltatis multipartitis rugosis pinnato-laciniatis acutis, petalis integris. *Hud. Fl.* 264 (2d. ed. 302.

Cl. L. Monadelphia Decandria.

Crowfoot Cranesbill.

Found withinside of Mr. Warner's pale pond on the forest.

It flowers in June, July.

HERBA Paris. *Raii* Syn 264.

PARIS [*quadrifolia*]. *Hud. Fl.* 150 (2d. ed. 172.)

C.L. Octandria Tetragynia.

Herb Paris, True love or One berry.

In a copse the South Corner of Mr. W.'s large meadow.

March April.

Against this entry Edward Forster notes the additional records, "In Wintry Wood, Epping, and more abundantly in Knightsland Wood, Stanford Rivers." (John Ray)."⁹

HESPERIS *matronalis*. [Forster intercalates the observation, "this is not an English plant, therefore it is a mistake to mention it as growing wild."]

In a field near Mr. Hervey's, Chigwell. [I have seen it there.]

HOTTONIA *palustris*. See p. 248.¹⁰

LACTUCA *sylvestris murorum flore luteo.* *R. Syn.* 162.

PRENANTHES [*muralis*] flosculis quinis, foliis lyratohastatis. *H. Fl.* 296. *runcinatis* 2d. ed. 338.

Cl. Lin. Syngenesia Polygamia æqualis.

Ivy leaved Sowthistle or wild Lettuce.

Found in a lane between Fair mead bottom and Chingford. July.

Edward Forster notes against this entry, "Found on the edge of the Forest near Highbeach, in a lane from Henault Forest to Lamborn."

LINUM *sylvestre sativum plane referens.* *Raii* Syn. 362.

L. [*usitatissimum*] calycibus capsulisq; mucronatis, petalis crenatis foliis lanceolatis alternis, caule subsolitario. *H. Fl.* 115. 2d. ed. 133.

C.L. Pent: Pentagynia. Common Wild Flax.

In cornfield. Found between the Bald faced Stag on the Forest and Chigwell Church. June.

Forster gives the following additional records, "In Mark's house field and on the Forest, on the bank of the Oil Mill stream at the bottom of Marshstreet. On Archers piece (?) on the Forest, and Woodford."

SAXIFRAGA *rotundifolia alba.* *Raii* Syn. 354.

S. [*granulata*] foliis reniformibus lobatis, caule ramoso, radice granulosa. *Hudson's Fl.* 159. 2d. ed. 182.

9. For an account of John Ray, of Epping, see post, p. 231. A specimen of *Paris quadrifolia* collected by Ray "near Epping" is in the Club's herbarium.

10. The reference is again to T. F. Forster's *Additions* of 1784, where, on the page given, the Water Violet is duly recorded, and Edward Forster adds the note, "this was found by Warner and is in his MS. Additions in Wadham College Library."

Cl. L. Decandria Digynia.

White Saxifrage. *Between Muncombe and the river Rhodon.* May.

Sison segetum. See p. 252.¹¹

Sium sive *Apium* palustre foliis oblongis. *Raii Syn.* 211.

Sium [*erectum*] foliis pinnatis umbellis axillaribus pedunculatis, involucro universali pinnatifido. *Hudson's Fl.* 103.

S. [*angustifolium*] foliis pinnatis, foliolis cordatis lobatis inæqualiter serratis, umbellis pedunculatis oppositifoliis terminalibusqs. *Hud.* 2d. ed. 119.

Pentandria Digynia.

Common Upright Water Parsnep.

Found in some ponds near the Windmill. July.

Forster adds his record, "Found in a claypit on the Forest near Hale End."

LIMNOPEUCE. *Raii Syn.* 136.

HIPPURIS [*vulgaris*] *Hud. Fl.* 1 ed. 22.

Cl. L. Monandria Monogynia.

Mare's-tail.

Found in a ditch by the roadside near Abridge and in some stagnant water near the Gravelpit pond on the Forest.

Among the more interesting of the manuscript records, whether from the botanical or from the local topographical point of view, are the following, those which were additions to Warner's list being marked with an A:—

Geranium pyrenaicum "One plant in Shernal street near Tinkers brook bridge."

A. *Valeriana rubra* [now *Kentranthus ruber*]¹² "on Mr. Shepherds wall Upton."

Acorus calamus "in a pond in a lane between Chigwell Row and the road & in Mr. Lockwood's Deuxhall park, Lamborn."

Asplenium Adiantum-nigrum "on a wall in Capworth street, at Wansstead B.M.F.,¹³ on the wall of a Haha in front of House near Bushgate Wanstead."

Allium vineale "in the marshes near the Path leading from Waltham stow Marshstreet to Lea bridge & in the lane leading from Hoe street to Marks house common field & elsewhere, in Higham hill field, on a bank in Angel lane Leyton."

A. *Alsine marina* [now *Alsine marginata*]. "In Plaistow Levels, and near Rainham Creek."

Sagina erecta [now *Moenchia erecta*]. "on the Forest near Woodford."

11. i.e. of T. F. Forster's *Additions* of 1784, where this plant is duly recorded. Edward Forster there notes, "This was found by Warner in the lane & Churchyard at Chingford & is in his MS. *Additions*"; and he adds the additional stations "near Chingford Church, and in the marshes near Barking Creek in the way to Wall End."

12. The modern nomenclature given in square brackets is that followed by the British Museum authorities.

13. The initials B.M.F. occur several times against records, and denote that the particular record rests on the authority of his brother Benjamin Meggot Forster. It is pleasing to see how the brothers gave due credit to each other for their discoveries. c.f. Benjamin's own record, *ESSEX NATURALIST*, xix., p. 85.

- Sedum telephium*. "in a field near Woodstreet & on the side of Angel lane betwn Leyton & Stratford, etc."
- Ægopodium podagraria*. "in our garden in Hoe Street."
- A. *Zannichellia palustris*. "In a pond in Clay street opposite Mrs. Williams's in ponds & marsh ditches common."
- Apium graveolens*. "In the Marshes near the Thames plentifully, but not to be found in the places mentioned by Warner," that is, about Woodford Bridge and on the Roding banks.
- Antirrhinum majus*. "on a wall in Claystreet and elsewhere not uncommon."
- Asperula odorata*. "never yet found by us within the limits. It is an Essex plant, as in Duelds (? Dudds) Wood, near Henham."
- Asplenium ceterach* [now *Ceterach officinarum*]. "This is not to be found on Dr. Wilkinson's wall, nor did he ever see it there but Mr. Warner inserted it, having as he thought formerly seen it there, on a tombstone in Woodford Church yard on the E. side of the chancel 1812."
- A. *Aster tripolium*. "on the Banks of the Thames."
- A. *Hypericum elodes*. "In gravelpits on the Forest near the road which leads from Honey lane to the Epping road, on bogs on the Forest beyond Loughton."
- Botanists will be thankful that Edward Forster did not give a too-close locality for this Forest rarity, which still occurs in the neighbourhoods mentioned.
- Atropa belladonna*. "Found 13 May 1794. On the Forest between Warner's Gravelpit Pond & the two Brewers a suspicious place also near the end of the Buckstile Walk, 1801."
- Betula alba*. It is an interesting proof of the extraordinary manner in which the Birch has invaded the Forest district within the last century (Warner describes it in 1771 as "not very common") to find Edward Forster recording its occurrence in detail, thus, "Found in the woody part of the Forest not far from Hale End May 1794, in woods near Park hall Theydon Gernon plentifully & on the forest near Coopersale & Park hall, in Great Shrub-bush." His entries are in ink of varying degrees of blackness, and would appear to have been made at considerable intervals of time : it is clear that in his experience the Birch, now so abundant in the northern half of the Forest as to be regarded as a nuisance to be kept down rather than encouraged, was of comparatively rare occurrence.
- A. *Campanula hederacea* [now *Wahlenbergia hederacea*]. "On the Forest at the head of a long bog between the Kings Oak and the hedge beyond Highbeech very uncommon. It flowers July or August. & in a bog S.E. of the Kings Oak & other bogs thereabouts in Ambres Banks." The Ivy-leaved Campanula was evidently more widely distributed in the Forest in Forster's time than it is now.
- A. *Campanula rapunculus*. "near a new house beyond Romford Common where the ground had been lately thrown up rather a suspicious place."

- A. *Cardamine hirsuta*. "In shady places near & on the banks of a brook running from Fair Mead bottom to Chapel End in great plenty in a hedge the edge of the forest beyond Muncombe."
- Carduus Marianus* [now *Silybum Marianum*]. "Near Barking & Ripple side, Dagenham plentifully, near Higham hill field."
- Centaurea calcitrapa*. "not fd in this place" [i.e., where recorded by Warner, at Woodford Row] "but in the marshes near Plaistow."
- A. *Carduus acaulis*. "On Henhault Forest between Chigwell row & Hoghill."
- A. *Stellaria glauca* [now *Stellaria palustris*]. "In the marsh ditches between Westham & the Thames—in a pit in Wrangling Meadow Chingford hall."
- A. *Dianthus caryophyllus*. "naturalised on a wall at the Tower in the Wall Greenstreet near Plaistow."
- Dianthus armeria*. "in the lane from Chingford to Chingford hall,¹⁴ between Coopersale & Abridge," and there is added against the first given locality the further note "again 1839," written in pencil.
- Lathyrus nissolia*. "In Higham hill common field, & in a field not far from the end of Hagger Lane, thro which there was a path to Woodstreet; on the forest between Honey lane & Epping Green in Hitherwest field near Hale End House."
- Tordylium nodosum* [now *Torilis nodosa*]. "In Shernal street under the wall of Tony hall."
- A. *Centunculus minimus*. "Found on a bog S.E. of the Kings Oak on the Forest with *Camp. hederacea*."
- A. *Anthemis arvensis*. "In cornfields & waysides. Found in & near Mark house field."
- A. *Chara translucens*. "Found in a gravel-pit on Hainault Forest on the left of the track from Fairlop to Hoghill. Found in a gravel-pit on the Forest near the Windmill, & behind Prospect House Woodford Wells."
- A. *Chenopodium acutifolium* [now *C. polyspermum*]. "in gardens & waste places & on dunghills very common."
- A. *Chenopodium glaucum*. "On & near a dunghill between Chingford hatch & Chingford, near the end of the lane which runs North of the Larks."
- Chenopodium hybridum*. "Found in Langbridge Lane Barking E. of Langbridge Farm. 20. Sept. 1841."
- A. *Carduus pratensis*. "Found on the Forest between Hale End & the Windmill on the right hand from the road near the back of the Poulterers. very uncommon. on a bog S.E. of the Kings Oak."
- Clinopodium vulgare*. "Found by the roadside beyond Pissingford bridge, among bushes on the edge of a pond in a field leading from the end of the watery lane to the Oilmills below Marsh street Walthamstow.¹⁵ On the Forest near Epping."
- A. *Cochlearia anglica*. "On the Banks of the Thames."
- A. *Cuscuta epithymum*. "On the forest between Hagger lane & Woodford."

14. c.f. Benjamin Forster's record, dated 1808. ESSEX NATURALIST, xix., p. 85.

15. From Benjamin Forster's record we are able to date this find as 10 Aug., 1794. See ESSEX NATURALIST, xix., p. 74.

- A. *Cynoglossum sylvaticum* [now *C. montanum*] "in Hagger lane, Clay street, and about Chingford in Henault forest, plentifully."
- Alisma damasonium* [now *Damasonium alisma*] "in ponds on the Forest about Walthamstow & Wanstead."
- Delphinium consolida* [now *D. ajacis*] "Buryfield. in the common field near Walthamstow Church."
- Dipsacus pilosus*. "in a lane on the left beyond Ilford. near Waltham Abby; near Stansted Rivers" (*sic.*) (presumably a slip for Stanford Rivers.)
- A. *Equisetum limosum*. "In ditches, bogs, sides of ponds &c. very common. It flowers in May June."
- Equisetum palustre*. "probably Warner meant *Equisetum limosum* which is very common in gravelpits & moist ditches. *Equisetum palustre* grows in Leyton Marsh near the roadside not far from the brook near the Marsh gate—in the marsh below Westham."
- Equisetum sylvaticum*. "*E. sylvaticum* has been now found by B.M.F. on the forest near Highbeech. probably this" [i.e., Warner's record of this species] "means *Equisetum fluviatile* which grows on the Forest near Snarebrook & between the Epping road & Honey Lane Green & in a wood near Chigwell—between the Red bridge & Moss foot green—in a field between Sewardstone green and Leppet hill."
- A. *Sisymbrium sylvestre* [now *Radicula sylvestris*]. "on the bank of the Rhodon near Woodford bridge plentifully—very uncommon."
- A. *Aspidium thelypteris* [now *Lastrea Thelypteris*]. "in a woody bog in a field near Epping probably forming part of Wintry Wood."
- Polypodium aculeatum* [now *Polystichum angulare*]. "Found in a hedge the edge of the Forest on the Hawk & in a lane near Walthamstow Church. in a lane between Barking & a house called Jenkins in great plenty."
- A. *Aspidium oreopteris* [now *Lastrea montana*]. "Found on the bank of a ditch the S. side of Snarebrook pond with *Osmunda spicant*" [= *Blechnum spicant*] "wild near Highbeech B.M.F. bog opposite Kings Oak. near Foxhatch & near Warley Common."
- A. *Aspidium spinulosum* [now *Lastrea spinulosa*]. "In Longdown Wood near Hale End, & on the Forest."
- A. *Aspidium lobatum* [now *Polystichum aculeatum*]. "in moist shady hedges, particularly in a lane leading from Hale End to Chapel End Walthamstow."
- Osmunda regalis*. "one plant on the Lower Forest beyond Epping 1840, near to Turnpike Road street, pointed out to me by Doubleday." This record is of considerable interest, not only botanically, it being the latest record of the Royal Fern as occurring in Epping Forest until my wife's discovery of a small plant near Monk Wood in 1919,¹⁶ but also because it suggests that Edward Forster (in 1840 a man of 75 years of age) in his old age took friendly botanical rambles with Doubleday. This record of *Osmunda* is doubtless the one included by Gibson in his *Flora of Essex* 1862, in

16. ESSEX NATURALIST, xix., p. 174.

the words, " Epping Lower Forest, very rare," which, we are told, Edward Forster supplied to him from his MS. notes.

- A. *Aspidium angulare* [now *Polystichum angulare*]. " in a lane from Barking towards Chadwell & in a green lane leading from Clay Hall into fields West."

Anethum foeniculum [now *Foeniculum vulgare*]. " wild in the marshes near Rainham."

- A. *Fumaria lutea* [now *Corydalis lutea*]. " on a wall at Knots green Low Leyton naturalized. on a wall in Shernhall street Walthamstow."

- A. *Trifolium ornithopodioides* [now *Trigonella ornithopodioides*]. " Found on the Forest between Woodford & Woodford Row not far from the Walk between hedges."

- A. *Glaux maritima*. " near the Thames at the mouth of Rainham Creek —near the Devils house (Kent County) below Eastham."

- A. *Geranium malvæfolium*. " By the roadside in a gravelly soil." [No locality given.]

- A. *Geranium lucidum*. " On a bank on the right hand of the lane from Barking to Rippleside Dagenham."

- A. *Gnaphalium sylvaticum*. " On the Forest between the Lakehouse & the Eagle & Child very uncommon & in the woody part of the Forest near Hale brinks. at Highbeech.

- A. *Triglochin maritimum*. " Found on the banks of the Thames (below Plaistow & Rainham)."

- A. *Serapias latifolia* [now *Helleborine latifolia*]. " Found on the Hawk & on the woody part of the Forest near Hale End & by the side of a little running stream between the Epping road & Honey Lane Green, on the forest between Woodford & Chingford Hatch near Mr. Harman's pales in the enclosed part of the Sale."

Inula helenium. " in a lane leading from the Bald faced Stag to Chigwell Church & under a hedge on the roadside in Loughton."

- A. *Hieracium sylvaticum*. " On forest near Highbeech."

- A. *Helleborus viridis*. " by a running stream by the side of the road to the Farm belonging to Coopersale Hall. Found by Mr. J. Ray, Epping."¹⁷

- A. *Crepis biennis*. " in the marshes near Rainham."

- A. *Leontodon hirtus* [now *Thrincia nudicaulis*]. " Found on the open parts of the Forest & on garden grassplats."

- A. *Centaurea laciniata*. " On the sides of fields. common."

Iris fœtidissima. " in Green leaves lane & between Chapel End & Higham Hill, in a field near Hale End between Inks Green & Chingford lane."

- A. *Triglochin palustre*. " in marshes. Found in the Callico Grounds belonging to the house called the Grove Westham. It flowers in July or August. in Plaistow Levels."

Galeopsis galeobdolon [now *Lamium galeobdolon*]. " On the Hawk's

17. John Ray, of Epping, a little known collector of local plants, referred to in Gibson's *Flora of Essex*, 1862. Some 151 of his specimens are in the Club's herbarium, but the dates of collection have been deliberately erased. The collection was probably made in 1841 to 1843. See ESSEX NATURALIST, xi., p. 224.

eye & in Ribton Lane & in the Larks. on the Forest between the Epping road and Warleys."

A. *Rumex pulcher*. "On the forest by the roadside from Wanstead to South lane & near Laytonstone."

A. *Rumex maritimus*. "On the Forest bet. Hale End & the Sale in Eastham marshes near the Devils house & near Dagenham, between Greenstreet & Plaistow & in the Lake near Wanstead, in the Basin in Wanstead Park."

A. *Rumex palustris* [now *R. limosus*]. "in the Basin in Wanstead Park."

A. *Rumex pratensis* [now *R. acutus*]. "by the side of the Woodford bridge road between the 8 mile stone & the bridge, beyond Abridge, & in the marshes near the Thames?"

A. *Lemna gibba*. "in a brook in the Lea bridge road."

A. *Utricularia vulgaris*. "In Hog hill Pond on Henault Forest first found by J. Woods,¹⁸ in the marsh ditches between Westham & the Thames, in a pit on Henhault Forest with *Chara translucens*, in gravel pits on the Forest between Woodford & Chingford hatch."

A. *Limosella aquatica*. "in cartruts in Higham bushes in Epping Forest, near the E. pales of Mr. Harman's New inclosure. 1824. found by J. W. Griffiths 1822."

A. *Antirrhinum spurium* [now *Linaria spuria*]. "in a field adjoining the Forest near the Hawks Mouth not far from Gilwell house 11 July 1833 & in a field near Latton priory. in a field at Great Parndon."

Osmunda spicant [now *Blechnum spicant*]. "Found near Snaresbrook pond. on the side of a little running stream in the Forest between the Epping road & Honey lane green & other parts of the Forest between Loughton & Epping in plenty."

A. *Epilobium roseum*. "by the side of a ditch near Waltham Abby in the road to Epping. by the roadside beyond Little End Stanford Rivers & between Epping Long Green & Brodley Common. in the road from Epping Bury to the Church. between Nasingbury & Nether hall."

Epilobium palustre. "Certainly in a boggy place E. of Snaresbrook Pond 25 July 1844.¹⁹ In the great bog near Salters Buildings and on a bog near Haggard Lane. on bogs on the forest."

A. *Lysimachia nemorum*. "in moist woods. Found in the woody part of the Forest, near Hagger Lane, to the W. of Golders hill Loughton & between Honey lane green & the Epping road. near Highbeech. near Foxhatch. on the Forest near Epping."

Menyanthes trifolia [ta]. "On a bog on Wanstead heath. on a bog near Fairlop, on Henault forest, in the marsh between Westham Abby & the Iron bridges, on the Forest beyond Coopersale."

A. *Mentha sativa* [now *M. gentilis*]. "Found on the banks of the river Lea in Low Leyton marshes not far from Lea bridge nearer Leyton than the Horse & Groom. & in the brook near Salisbury hall at Chapel End."

Mentha piperita. "in a ditch near Whips cross, in a ditch in a field

18. Possibly Joseph Woods, F.L.S. (1776-1864), author of the *Tourists' Flora*, 1850.

19. This is the latest dated record, and is of interest as showing how Edward Forster's passion for noting the occurrence of wild flowers was maintained to old age: at the date recorded he was in his 79th year.

near Little Dublin Clay street. fd. also formerly in Hoe street but now gone."

A. *Mentha gracilis* [now *Mentha gentilis*]. " On the bank of the River Lea below Higham hill. 1792. B.M.F."²⁰

A. *Mentha sylvestris* [now *M. longifolia*]. " by the roadside near Salisbury hall Chapel End."

A. *Mentha rubra* [now *M. gentilis*]. " in a ditch in Markhouse lane Walthamstow."

Mercurialis annua. " on a dung hill near Mr. Todds below Marsh street Walthamstow."

Myosurus minimus. " In a field between Salisbury Hall Chapel End & Chingford hall lane. found formerly near Woodstreet."

A. *Erysimum cheiranthoides*. " Found on a dunghill in a field adjoining to Higham hill field."

A. *Narcissus biflorus*. " in a field East of Woodford Green not far from the spot where *Trifolium ornithopodioides* grows, in a field belonging to Scott's, Hale End."²¹

Narcissus pseudo-narcissus. " in a field at Low Leyton belonging to Mrs. Moyer adjoining a narrow lane the footpath to Leytonstone 1799.²² also nearer Leytonstone B.M.F."

A. *Iberis nudicaulis* [now *Teesdalea nudicaulis*]. " On the Forest near opposite the end of Eastham lane, plentifully."²³

Nepeta cataria. " Near the Red bridge Wanstead, & near Waltham Abby."

Ophioglossum vulgatum. " In our field adjoining to the lane leading from Hoe street to the Common field.²⁴ by the roadside on Leppet hill. in Shoulder of Mutton field Hale End."

Viburnum opulus. " in the Lea bridge road opposite the Wooden bridge & near the Red bridge, Wanstead, in a wood near Chingford lane & Longdown Wood Hale End."

A. *Habenaria chlorantha* [now *H. virescens*]. " In Knightsland Wood Stanford Rivers. Found by Mr. John Ray."

Ophrys spiralis [now *Spiranthes spiralis*]. " On the Forest near the Great Bog near Salter's Buildings."

A. *Papaver dubium*. " In corn fields. Found in Markhouse field."

A. *Polygonum minus*. " in a bog in the woody part of the Forest, by the road from Hagger lane to the Windmill & betwⁿ Loughton & High-beech & near the Kings Oak, in other bogs near the Windmill."

Asplenium scolopendrium [now *Phyllitis scolopendrium*]. " On a wall near Marshstreet, in a hedge between Friday hill & Chingford."

A. *Alisma ranunculoides*. " in Wanstead Lake, the pond on the Forest called the Lake near Wanstead plentifully."

20. cf. Benjamin Forster's own record, ESSEX NATURALIST, xix., p. 82.

21. Scott's was the cottage residence of his brother, Benjamin Meggot Forster, from the death of their father in 1812, until his own decease on 8th March, 1829. The property comprised 20 acres of copyhold land held at a quit rent of 7 shillings, and Mr. G.F. Bosworth records that the fine paid in 1811 (possibly by Benjamin when entering upon the tenancy) was £105.—(*The Manors of Low Hall and Salisbury Hall, Walthamstow*, 1920, p. 20).

22. c.f. Benjamin Forster's and Pamplin's accounts of this occurrence of Wild Daffodils, as given in ESSEX NATURALIST, xix., pp. 75-76.

23. c.f. Benjamin's fuller and dated record. *ibid.*, p. 82.

24. c.f. Benjamin Forster's dated record. ESSEX NATURALIST, xix., p. 86.

- A. *Plantago maritima*. "near the Thames at the mouth of Rainham Creek."
- A. *Littorella lacustris* [now *L. uniflora*]. "in the pond called the Lake on the Forest near Wanstead T.T.F.²⁶ near the basin in Wanstead Park."
- Potamogeton compressus*. "In a gravel-pit & in Hoghill Pond on Henault Forest."
- A. *Potamogeton heterophyllus*. "In the pond called the Lake on the Forest near Wanstead. 27 July 1816."
- Pyrus communis*. "in a wood in Chingford lane & in a wood near Horn lane Woodford in Hither West field near Hale End House—in the Larks."
- Linum radiola* [now *Radiola linoides*]. "on the Forest near the Windmill. near the Bald faced Stag & near the Kings Oak."
- Rosa canina* β . *sarmentacea*.²⁶ "in hedges very common."
- Rosa surculosa* Woods.²⁶ "on the Forest near the End of Hagger lane."
- Rosa systyla*.²⁶ "in hedges & on the Forest—in Hagger lane & elsewhere."
- Rosa micrantha*.²⁶ "On the Forest near the End of Hagger Lane & elsewhere."
- Rosa dumetorum* Woods.²⁶ "in hedges. in Green leaves lane, Waltham stow and elsewhere."
- Rosa Borreri* Woods.²⁶ "in hedges—in the Lea bridge road & elsewhere. not uncommon."
- Rosa Forsteri* (*collina* β .) Woods.²⁶ "in Moons Lane leading from Chapel End to Higham hill Walthamstow, & on the Forest. in hedges common."
- Rosa tomentosa* (*villosa* β .)²⁶ "In a hedge in Walthamstow marsh near the end of the watery lane. in Chingford lane & elsewhere."
- Drosera rotundifolia*. "On a bog between Walthamstow & Wanstead & near Fairlop on Henault forest. on a bog S.E. of the Kings Oak & betwⁿ Loughton & Theydon Gate. on the Forest between Mill Cottage²⁷ & Long Acre & beyond Woodford Workhouse." This former extension of the Sundew all over the Forest, as compared with its very restricted range to-day, is interesting.
- A. *Sherardia arvensis*. "In a field sown with Trefoil leading from Clay-street towards Chapel End & in the Common Field near Walthamstow Church."
- Rubus corylifolius*.²⁸ "in hedges, common."
- R. glandulosus*.²⁸ "in hedges & on the Forest."
- R. affinis*.²³ "on the Forest between Hagger lane & Salter's buildings."
- R. nitidus* ?²⁸ "on the Forest."
- R. rhamnifolius*.²⁸ "in Longdown wood Hale End & elsewhere."
- β . *cordifolius*.²⁸ "in Longdown wood Hale End."

25. The initials are not very legible, but appear to be either T.T.F. or T.I.F. ; if the latter they may refer to Edward's nephew Thomas Ignatius Forster, son of his eldest brother, Thomas Furly Foster, but this is mere conjecture.

26. The nomenclature is Forster's. The records are inserted here for the benefit of students of the genus *Rosa*.

27. Mill Cottage, Woodford, on the Forest, was Edward Forster's residence during the later years of his life.

- R. leucostachys*.²⁸ "in Cow lane leading to Hale End Walthamstow."
R. plicatus.²⁸ "on the Forest."
Asplenium ruta-muraria. "on a wall at Leyton, on Epping Church, on a wall belonging to Cranbrook near Ilford."
 A. *Salix ascendens* Sm.²⁹ "On the Lower Forest between Wanstead Park & East Ham. & elsewhere."
Salix russelliana Sm.²⁹ "in hedges & near rivers."
Salix caprea.²⁹ "On the forest near the great bog between Salters buildings & the Windmill. & elsewhere."
 A. *Salix aurita* β.²⁹ "in moist places on the Forest."
 A. *Salix fragilis*.²⁹ "in hedges & near rivers."
Salix aquatica Sm.²⁹ "In moist hedges & on the Forest very common."
Salix repens.²⁹ "on Epping Forest."
Salix cinerea.²⁹ "On the Forest & in hedges."
Salix oleifolia Sm.²⁹ "in the Lea bridge road."
Salix prostrata.²⁹ "In a gravel-pit on the Forest near the Kings Oak Highbeech—upright? in Great Shrubbush."
Salix mollissima Sm.²⁹ "in meadows near the River Lea Walthamstow."
Salix stipularis.²⁹ "in marshes near the River Lea."
Salix Forbyana Sm.²⁹ "In the marshes near the River Lea."
Salix Lambertiana Sm.²⁹ "In the marshes near Lea Bridge."
Salix lanceolata.²⁹ "In the marshes near Higham hill."
 A. *Salix monandra* Borrer.²⁹ "In the marshes near the River Lea."
Salix triandra Hoff.²⁹ "Near the Rhodon in the Woodford bridge road."
Sambucus ebulus. "In Upton Lane opposite the garden wall of Upton house, probably escaped. since found on the edge of the Forest near Highbeech 1805. in a hedge by the bridle way from Chigwell Church to King's place, nearly opposite the moat & not far from the Rhodon. 1837."
 A. *Sagina apetala*. "On walls & gravel walks &c very common."
Chrysosplenium oppositifolium. "nowhere but in bogs among alders near Foxhatch & in the boggy thicket with *Osmunda regalis* near Warley Common."
Serratula tinctoria. "near Snaresbrook pond."
 A. *Sonchus palustris*. "Found in the marshes below Plaistow."
Sorbus aucuparia [now *Pyrus aucuparia*]. "in Great Shrubbush 1840."
 A. *Stachys ambiguum* [now *S. palustris*]. "in a ditch by the roadside in Hawcock Lane leading from the Forest to Coopersale 10 July 1840."
Taxus baccata. "One plant in the Larks 1840."
 A. *Lepidium hirtum* [now *L. heterophyllum*]. "On a bank the South side of Markhouse field Walthamstow. in a field between Hill house & Clayhall not far from Claybury 1835." The last station is subject to three ??? in pencil added by the recorder.
 A. *Thlaspi arvense*. "Found in the garden of the house called the Grove Westham late Mr. T. Williams's."

28. The nomenclature is Forster's. The records may be of service to students of this difficult genus.

29. Forster's records are inserted here for the use of students of the genus.

- Euphorbia platyphyllos*. "Found 1791 in the field the bottom of Horn Lane Woodford Row. in a cornfield near Claybury."
- A. *Tormentilla reptans* [now *Potentilla erecta*]. "on the Forest between Hagger Lane & Mill Cottage 3 July 1831. found there many years ago."
- A. *Tragopogon porrifolius*. "in a field near the Lea bridge road. B.M.F."³⁰
- Asplenium trichomanes*. "on a wall in Woodstreet now destroyed—at Mrs. Moyers Leyton."
- Medicago polymorpha* [now *M. arabica*]. "by the roadside near Waltham Abby in the road to Warleys. in Shernal Street."
- A. *Trifolium maritimum* [now *T. squamosum*]. "Found on the Forest between Woodford & Woodford Row with *T. ornithopodioides*, very uncommon."
- A. *Valeriana rubra* [now *Kentranthus ruber*] "on a wall at Upton."
- A. *Vaccinium myrtillus*. "In a corner of the Lower Forest beyond Epping near a Gate leading to Park hall Woods &c. 1843."
- Verbena officinalis*. "flowers pink, Ambres. bank (the camp) Epping Forest."
- A. *Veronica polita* [now *V. didyma*]. "in the garden at Hale End house."
- A. *Veronica montana*. "in Long Down Wood between Hale End & Chapel End Walthamstow."
- Vinca minor*. "in the Larks (also under Mr. Harmans pales in the Sale doubtful) in a hedge W. of Latton priory."
- Viola hirta*. "Found by the roadside between Woolston hall & Abridge. On Inks Green near Hale End. first found there by Miss Margaret Woods in a field near Inks Green."
- Solidago virga aurea*. "Found on the Forest between Loughton & Theydon Gate & between the Kings Oak & Copthall."
- Ophrys ovata* [now *Listera ovata*]. "In Mr. Norris's Orchard at Woodford. In Knightsland Wood, Stansted (*sic.*) Rivers 1843."
- Convallaria multiflora* [now *Polygonatum multiflorum*]. "Under a holly bush on the Forest not far from Epping Mill. first found by Edwd Doubleday."

Thus far the annotations to Warner's original book of 1771: the *Additions* of 1784, the work of his brother, Thomas Furly Forster, are in the same way annotated by Edward Forster, and new records noted:

- A. *Pilularia globulifera*. "in Lord's Pond, Hoghill in Henhault Forest. fd. by T.T.F."³¹
- Polypodium filix-fœmina* [now *Athyrium filix-fœmina*]. "on the banks of a rivulet in the woody part of the Forest beyond Loughton near the road which leads from Honey lane green to the Epping road. in an alder bog near Foxhatch."
- Hieracium umbellatum*. "in Park hall wood Theydon Gernon with more jagged leaves. in a spinney between Chingford Church & Chingford Green."

³⁰. For Benjamin Forster's more detailed record of this plant see ESSEX NATURALIST, xix., p. 81.

³¹ The initials are not very legible; see footnote, *ante* p. 234.

Mentha rubra [now included in the aggregate species *gentilis*]. " by the side of the stream from the Oilmills in Walthamstow marsh."

Adoxa moschatellina. " in a wood near Hale End, in the field belonging to Hale End house plentifully. near Clay hall Barkingside."

Ophrys nidus-avis [now *Nicotia nidus-avis*]. " Found again June 1786 " (i.e., in the place recorded by T. F. Forster, viz., " on the forest . . . near the Royal Oak, Hale End ") " & on the Hawk." ³²

Ranunculus parviflorus. " near Walthamstow Church & in the Lea bridge road near the lane to Leyton Church. in Clay street. near the road to Hellyers ferry, between Waltham Abby & Honey lane green." ³³

Jasione montana. " in Mark house common field & in a lane leading from Temple Mills to Holloway down."

Salix cærulea [now *S. alba*]. " in hedges & plantations very common."

Salix helix [now *S. purpurea*]. " probably most of these "[i.e., his brother Thomas's records of this *Salix*] " are monolla (?) Borr: the true *Helix* grows in a field called Great Stansted on Gibbon's Bush Farm Epping Long Green."

Samolus valerandi. " In the marshes near the Thames plentifully."

Trifolium subterraneum. " by the roadside between Waltham Abby & Warleys 1798."

A. *Rubus idaeus*. " in Wanstead Park."

This last note is in pencil on the rear fly leaf of the volume.

Forster comments on certain of Warner's records:—

Amarant[h]us blitum. " probably an error."

Fagus Castanea [now *Castanea vulgaris*]. " planted."

Spiræa filipendula " probably not wild there " [that is, " on a hilly field near Chingford Church," where it was recorded by Warner] " tho it is an Essex plant in the chalky parts of the County towards Cambridgeshire."

Polypodium dryopteris. " not to be found there " [on the walls of Chingford Church, where recorded by Warner].

Essex Braconids.—Mr. T. G. Lyle, F.E.S., of Cambridge, in a recent series of papers on the sub-family *Agathidae* (in *Entomologist*, vol. liii., 1920, and liv., 1921), describes Marshall's type specimens of these parasitic hymenopterons, contained in the Fitch Collection of Insects in the Club's Essex Museum, which types he has had the opportunity of examining.—
PERCY THOMPSON.

32. c.f. Benjamin Forster's corroborative records, *ESSEX NATURALIST*, xix., p. 87.

33. Benjamin's confirmatory record gives the respective dates ; see *ibid.* p. 72 (Plate iv.).

THE NESTING OF THE LITTLE AND COMMON TERNS, AND OTHER SPECIES, ON THE ESSEX COAST.

BY WILLIAM E. GLEGG, F.Z.S.

With Two Plates.

ON the 26th May, 1912, accompanied by two friends, I visited the interesting portion of the Essex coast where the Little Tern and the Black-headed Gull were said to nest.

For obvious reasons I do not state too definitely the position of the locality, but shall call it "Colchester Harbour."

We were quite successful in our quest, finding strong nesting colonies of both species. As we spent three days at the colonies, sleeping on the ground, we had time to work the area thoroughly.

LITTLE TERN.—The colony was situated on a shingle bank between the sea-wall and the sea, and at high tide was protected on one side by a creek which leads across the beach to the sea. Altogether 23 nests were found, three with one egg, eight with two eggs, and twelve with three eggs.

BLACK-HEADED GULL.—For nesting operations the gulls had chosen a rush-covered pond of considerable dimensions on the landward side of the sea-wall. Fifty-nine nests were found containing eggs, 39 had eggs of the brown type, 15 those of the green type, and five contained both these types. Twenty nests contained one egg, 17 had two eggs, and 22 three eggs. There were also several new nests which had not been laid in. One nest was built on a plank which formed a gangway through the marsh. When found, this nest contained one egg which on the following day had disappeared, probably the result of the egg-eating propensities of the gulls.

RINGED PLOVER.—This species was common. One nest with four eggs was found in the Little Tern colony.

In the marsh where the gullery was situated four nests of **MOORHEN** and one of **MALLARD** were found, all with eggs. Two **TEAL** were flushed here, **COOTS** were common, and **REED WARBLERS** were seen and heard singing. On the saltings **LAPWING** and **REDSHANK** were plentiful, and the nest of a **LINNET** with five eggs was found on the ground, a site which this species occasionally uses.

Landwards the NIGHTJAR was seen, and a nest of the SEDGE WARBLER with five eggs and one of the TURTLE DOVE with two eggs were found. It was noticed that the last mentioned species was decidedly common.

Other commoner species and nests were also found.

The War prevented me from fulfilling my intention of re-visiting this exceedingly interesting area, but I determined to get there last spring, and the 29th May 1920, saw me entrained for the coast.

On this occasion I was alone and spent two days in the area, putting up at the village, which somewhat curtailed my time.

It was too late to do anything on the evening of my arrival, but the following morning I made my way across the wide marshes towards the place where the Little Terns had been found nesting in 1912. Remembering how other Terneries had suffered on account of the military occupation of the coast I approached the beach with considerable misgivings, but these were to some extent allayed by the appearance of a LITTLE TERN flying along one of the "fleets," as the dykes are locally termed.

Having reached the shingle I proceeded watchfully along the shore towards the bank where the Little Tern had nested in 1912, but although I saw at least two more of this species near the bank I found nothing to lead me to conclude that there were any nests.

I now decided to explore that part of the coast which we had not investigated in 1912, and during my progress I noticed that the RINGED PLOVER was still well represented, and later I found a nest of this species with three eggs.

After traversing some miles of shingle, all of which would have provided the Terns with suitable nesting sites, I found my progress barred by a large creek and at this point the shingle is very extensive.

Here I noticed that there were many BLACK-HEADED GULLS on the saltings, and just before I reached the large creek I was abruptly brought to a standstill by the long drawn out *pee-r-r-r-ah* of the Common Tern. Despite a careful search with the binoculars I could see no Tern. A deluging shower of rain swept over the bank and suspended operations, but when this was over I had the good luck to get my glasses on to a Common Tern with a fish in its bill. I was convinced that the Terns were not nesting on

the shingle and made my way across the saltings to where I had seen the Black-headed Gulls. The large creek again stopped my progress, but signs were not wanting that the gulls were nesting on the opposite side, and I noticed that flying among those overhead were some Common Terns. As time was wearing on I decided to retrace my footsteps and devote the following day to seeking the nest of the Common Tern.

My way back to the village led me past the rush-covered pond which in 1912 had housed the gullery, but the marsh was now almost completely deserted, although there were signs that one or two pairs might be nesting. This Gullery, like the Ternery, has probably suffered by the military occupation. However, the Reed Warblers were still to the fore in the marsh, also Coots and Moorhens, and a number of SHOVELERS were flushed, a species not found on the 1912 visit.

The next morning, having on the previous day located the position on the map, I started out in the hope of reaching from the landward side the place where the Gulls and Common Terns appeared to be nesting, thus avoiding the large creek. After threading my way among the maze-like creeks for nearly an hour, with a couple of hundred gulls shrieking over my head, and dashing at me in characteristic manner, I found a nest with eggs of the BLACK-HEADED GULL and as I progressed the nests were seen on all sides. They were built on the ground and composed of the usual mass of material.

Occasionally, amidst the clamour of the Gulls, I could hear the note of the Common Tern, but it was no easy matter to pick out the Terns among the very numerous Gulls. Later I found a spot where several Terns were calling, and as they seemed to remain much in the same place I sat down to watch. In a little time I could see several Terns landing, the graceful manner in which they arch their wings on reaching the ground making it easy to distinguish them from the Gulls, which are much more clumsy. Each time the birds were disturbed I noticed that one or two Terns always returned to the same place. Fixing the spot by a noticeable object I made as straight for it as the creeks would permit, and soon found a nest of the COMMON TERN and later another a few yards distant. Each nest contained three eggs. The nests were situated in the midst of the Gullery with Gulls' nests a few yards distant. I think it is not unlikely that I



NEST OF BLACK-HEADED GULL.



NEST OF COMMON TERN.

have quite by chance stumbled on the colony of Common Terns and Black-headed Gulls recorded by Mr. T. Hepburn in *The Zoologist* 1910, and again by Mr. W. B. Nichols in *British Birds*, (vol. vii., 1913).

I have seen no reference in print to the colony of Little Terns with which I have dealt.

With regard to the status of Essex Terns, Mr. Miller Christy in his *Birds of Essex* states "Common Tern : An uncommon summer visitor, which used to breed on our coast, but does not now do so." "Little Tern : A summer migrant which used to breed commonly on the Essex coast, though I only know of a single breeding colony at the present time."

Apparently the colony of Little Terns referred to by Mr. Miller Christy is not the one dealt with in this note.

We can now say with certainty that the Common Tern still nests in Essex, and I think that the presence of the Little Tern at such a date points to the probability of its breeding, and I hope at some time to be able to prove that the nesting colony of 1912 has not been entirely destroyed.

My visit was mainly devoted to the Terns, but the following species which I identified are not without interest, CORN BUNTING, RED-BACKED SHRIKE, BLACKCAP, SPOTTED FLYCATCHER, TURTLE DOVE (again found to be exceedingly common, whilst in some parts of Essex it is decidedly otherwise), YELLOW WAGTAIL, REDSHANK (very numerous and no doubt nesting), SHELDUCK (said to nest, which is very likely, but evidence is required), and CURLEW.

Essex Hydroids.—Our member, Mr. F. J. Lambert, has kindly supplied the Club's Museum with, among other specimens, the following living hydrozoans, collected by himself at Southend-on-Sea, or neighbourhood, during the winter of 1920-21, viz. :—

Clava multicornis, Forsk. *Campanularia flexuosa*, Alder.

Tubularia larynx, Ellis and Solander.

Actinogonium pusillum, van. Ben. *Gonthyrdea Loveni*, Allm.

Obelia dichotoma, Linn. *Sertularia pumila*, Linn.

In view of the meagre records of Hydrozoa from Essex waters it seems desirable to publish the above, which have been determined by Mr. A. K. Totton, of the British Museum (Natural History).—PERCY THOMPSON.

MORE ABOUT "MOORLOG"—A PEATY DEPOSIT FROM THE DOGGER BANK IN THE NORTH SEA.

By H. WHITEHEAD, B.Sc.

With Two Illustrations.

[Read 30th October, 1920.]

ELEVEN years ago I read before the Essex Field Club a paper on "Moorlog"—a peaty deposit so named by fishermen, who dredge up considerable quantities of it in the North Sea, particularly near the Dogger Bank. That paper, the joint work of Mr. H. H. Goodchild and myself, was published in the *ESSEX NATURALIST*, 1909.¹ My present aim is to summarise the conclusions arrived at in that paper, and then to report on further researches.

Careful consideration led to the conclusion that the peat was dredged from the place in which it was originally deposited, being part of a land surface which once extended from England to the Continent, but had become submerged. The late Mr. Clement Reid and Mrs. Reid, who kindly examined samples of this peat, reported that the plant remains pointed to the deposit having been formed in the middle of a vast fen, with a climate not much different from our own.

Between 1909 and 1913, about 20 more samples of moorlog came to hand, dredged between latitudes $54^{\circ}30'$ N. and $55^{\circ}50'$ N., and longitudes $2^{\circ}40'$ E. and $5^{\circ}18'$ E, over an area a little larger than Yorkshire, at an average depth of about 20 fathoms.

The Club had a brief summary of work on some of these samples in 1912; that summary has not been published. Since my return from Active Service I have spent much time on the examination of the remaining samples. I am indebted to Mrs. Clement Reid for identifying some of the seeds and fruits; to Mr. D. J. Scourfield, F.Z.S., for examining and naming remains of Entomostraca, and to Mr. K. G. Blair, F.E.S., of the British Museum, for determining beetle remains.

Some 40 species of flowering plants have been isolated, all of them still found in the British Isles. Bog-bean grew profusely in great swamps with the moss *Hypnum* and common Bog-moss *Sphagnum*, the latter being the less abundant. The

¹ *ESSEX NATURALIST*, Part 1., vol. xvi., 1909, pp. 51-60.

Common Reed flourished with other marsh plants, including sedges. Mrs. Reid identified three species of *Carex*, *C. rostrata*, *C. flava* and *C. pulicaris*, besides Floating Sedge (*Scirpus fluitans*) and Creeping Sedge (*Eleocharis*). Associated with these came Water Plantain, Bur Reeds, *Sparganium ramosum*, *S. simplex* and the floating variety *S. natans*. Plants with more conspicuous flowers include Ragged Robin, Willow Herb, Greater Spearwort, Meadow Sweet and the Marsh Cinquefoil. A complete list of animals and plants is given in Appendix B.

Of trees, remains of branches, roots and fruits show the Birch to have been widely distributed; a few nuts prove the existence of Hazel, and leaf impressions indicate the Willows *Salix aurita* and *S. repens*. Numerous pollen grains of a species of Pine—probably *Pinus sylvestris*—form the only other evidence of trees. An unidentified fern was plentiful, its sporangia appearing.

The flora of the Dogger Bank on the whole must have been similar to that of the fenlands of East Anglia to-day, though a comparison of the floras reveals great gaps in that of the Dogger Bank. The geological record is by no means perfect. Birch stems, fruits and roots survive, willow leaves make impressions, reeds bequeath easily recognisable rhizomes, the hard parts of fruits—*Carex* fruits for instance—remain, but many Fenland plants, e.g., orchids, sundews and Grass of Parnassus have tiny seeds, so minute that one could hardly hope to recover them. Again, a fertile seed on germination ruptures its seed coat and so destroys the best evidence of the plant's existence. This raises a point of great interest. Why are seeds of Bog-bean so numerous and why have so large a proportion of them the testa intact? Were large numbers of them sterile? The achenes of the Marsh Cinquefoil, on the other hand, have been split open, as if germination had taken place.

No bones of any kind have been found.

Beetle remains occur in the form of elytra or wing cases. Mr. Champion determined nine species, chiefly common marsh insects. I have recently picked out 56 specimens and among these Mr. Blair has recognised six genera and has been able to give specific names in five cases. The insects are all Fenland species still in existence, the commonest being *Donacia* which lives on marsh plants.

The non-appearance of remains of other insects may perhaps be explained by the fact that the method of recovering seeds and fruits reduces more fragile organisms to very small fragments. I am experimenting now in the hope of finding a method which will lead to the recovery of remains of other orders, as Diptera, Neuroptera and Hymenoptera.

As evidence of flora and fauna accumulates, reconstruction becomes possible. Sample No. 5 (See Appendix A, p. 247) contains remains of Water-lilies, Floating Pond Weed, *Nitella*, Entomostraca, Fresh-water Sponge and *Plumatella*. Such an assemblage of organisms suggests that the deposit accumulated at the bottom of a large pond.

Sample No. 6, though only $4\frac{3}{4}$ inches in thickness, shows an interesting transition in conditions of deposition. A section is shown in fig. 1, and indicates a typical brown peat with birch stems passing into mud-like material formed of finely-divided plant remains wherein brackish-water plants (*Ruppia rostellata*) and animals (cockles) are imbedded. In the diagram, brackish-water organisms are placed on the left and fresh-water and land organisms on the right. There is no direct evidence as to which were the upper and which the lower layers of this deposit, but it would seem more probable that the mud overlaid the peat; for the mud consists of detritus derived from the peat, that disintegration taking place during an inundation by the sea, most likely during subsidence. This seems to be the most feasible explanation for the association of remains of a submerged brackish-water plant like *Ruppia* with those of a typical land plant, the birch.

Shelly clay in association with Moorlog has been described by Mr. J. W. Stather, F.G.S.,² who suggests that the shelly clay overlies the peat.

Despite the rich and varied harvest of organic remains yielded by Moorlog, there is yet little evidence as to the age of the deposit. Probably there is more than one peat bed in the Dogger Bank, for one specimen contains sub-arctic plants, among them, the Dwarf Birch, *Betula nana*. Clement Reid,³ speaking of the relationship of the Dogger Bank deposits to similar ones in Great Britain, says: "These questions cannot be answered con-

² J. W. Stather. "Shelly Clay Dredged from the Dogger Bank," *Quart. Journ. Geol. Soc.*, vol. lxxiii., 1912, pp. 324-27.

³ Clement Reid, F.R.S., *Submerged Forests*, 1913, p. 47.

clusively without scientific dredging, to fix the exact positions and depths of the outcrops of moorlog."

I do not know whether, at the time of writing this, Clement Reid knew that many of the samples contained pollen grains of *Pinus*. In the absence of more specific evidence I venture to


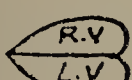

 Cardium.	 Cardium.	BLACKISH MUD fragmentary plant remains.	—
Ruppia rostellata.	MUD		Sphagnum (traces) Entomostraca Fern Sporangia Beetle remains
 Cardium.	Ruppia rostellata	DARK BROWN DEPOSIT WITH BIRCH TWIGGS.	Scirpus Menyanthes 4 ³ / ₄ "
Ruppia rostellata	Birch remains		
—	TYPICAL REDDISH-BROWN	Strap-shaped leaves (unidentified) Pollen grains of Pinus	
PEAT			

FIG. 1.—SECTION OF SAMPLE OF MOORLOG
 (Sample No. 6).

suggest that these pollen grains may supply a clue. The Scots' Pine was abundant in Western Europe and in England during part of the Neolithic period. The oak, alder and beech followed in turn; Moorlog has no evidence of these three. The pollen grains may have been blown from pine trees which grew in Neolithic times on higher ground surrounding the great fen.

I enquired of the Secretary of the Royal Meteorological Society as to the possibility of pine pollen being carried to great distances ; and also as to the probable direction of prevailing winds in prehistoric times. I have to thank the Assistant Secretary,



FIG. 2.

Mr. A. Hampton Brown, who kindly referred my communication to Mr. C. E. P. Brooks, M.Sc., who says : " There is no reason why pollen grains should not be carried hundreds of miles by winds of very moderate strength." Mr. Brooks continues : " The

winds were probably prevailing westerly, the prevailing direction at present being rather more south-westerly."

I have to thank Mr. Brooks also for drawing my attention to a paper on the subject.⁴ A westerly or west-north-westerly wind would have carried pollen across the Dogger Bank from places where the counties of Yorkshire and Lincolnshire now stand.

Other evidence as to age may come to light: in the meantime one may surmise that at least a portion of the Dogger Bank was above sea level as late as Neolithic times.

APPENDIX A.

Positions and Depths of Samples of Moorlog examined.

The depths are taken from the Admiralty chart of the North Sea.

1.	54° 30' N.	2° 40' E.	19 fathoms	Blackish, fine grained.
2.	54° 55' N.	2° 55' E.	15 do.	Black, earthy looking deposit.
3.	55° 50' N.	3° 30' E.	29 do.	Brown material.
4.	55° 20' N.	5° 18' E.	21 do.	Consists chiefly of <i>Hypnum</i> .
5.	55° 30' N.	3° 30' E.	20 do.	Dark mud-like deposit, with leaf impressions.
6.	55° 10' N.	4° 20' E.	22 do.	For description see p. 244.
7.	55° 39' N.	3° 43' E.	26 do.	Brownish peat with birch stems.
8.	54° 48' N.	3° 49' E.	24 do.	Mud-like deposit.
9.	54° 50' N.	4° 25' E.	29 do.	Brown, compact peat.
10.	54° 50' N.	4° 40' E.	22 do.	Nearly black compact peat with recently dead specimens of <i>Pholas parva</i> . ⁵
11.	55° 32' N.	4° 27' E.	18 do.	Light brown peat.
12.	54° 50' N.	4° 35' E.	22 do.	Dark brown peat bored by <i>Pholas parva</i> .
13.	54° 46' N.	4° 0' E.	28 do.	Dark brown peat.
14.	55° 20' N.	5° 10' E.	23 do.	Light mossy peat bored by <i>Pholas parva</i> .
15.	55° 0' N.	4° 38' E.	23 do.	Brown, mossy peat.
16.	55° 50' N.	3° 50' E.	28 do.	Brown peat.
17.	55° 40' N.	3° 15' E.	30 do.	Brown mossy peat.
18.	55° 46' N.	3° 53' E.	28 do.	
19.	55° 20' N.	4°-4° 40' E.	23-27 fathoms.	
20.	First sample "This End." ⁶			
21.	Second sample "This End." ⁶ 54° 30' N. 2° 40' E.			
22.	Third sample "Tail end." ⁶			

4. J. Fairgrieve. "Evidence of Meteorological Conditions in the Distant Past," *Quart. Journ. Roy. Meteorological Society*, 46 (1920), pp. 438-39.

5. "Pholas never makes its home in loose blocks. . . . If, as I think, this species takes two years to reach full growth, then it is evident that the ledge of Moorlog full of half-grown specimens must have been exposed to the sea continuously for one year, but not for longer."—Clement Reid, *Submerged Forests*, p. 43.

6. *ESSEX NATURALIST*, xvi., p. 56.

APPENDIX B.

List of Organisms found in Moorlog.

The numbers indicate the samples in which they were found.

ANIMALS.

COLEOPTERA.

Notiophilus *sp. aquaticus* }
or *palustris*.⁷ } 19.

Chlaenius holosericeus.⁷ 19.

Amara *sp.* 17.

Anchomenus atratus. ? *sp.* 9, 17 ?

Ilybius aenescens. 17.

Cyclonotum orbiculare.⁷ ? loc.

Cercyon *sp.* 17, 18.

Philhydrus *sp.*⁷ ? loc.

Aphodius *sp.* 18.

Donacia simplex. ? 13, 17, 18.

D. vulgaris (*typhae*).⁷ ? ? loc.

D. clavipes (*menyanthidis*)⁷ ? loc.

D. sericea. 9, ? 13, ? 17, 18.

D. sp. 9, 11, 13, 18.

Apion *sp.*, possibly *humile*.⁷ 19.

Otiorrhynchus maurus. 17, 18.

O. sp. aff. ligneus. 17.

Baris pilistriata.⁷ 19.

MITES.

? *Notaspis*. 3.

ENTOMOSTRACA.

CLADOCERA.

Daphnia *sp.* Ehippia only—apparently of *D. pulex* type.

Ceriodaphnia *sp.* (Ehippium only, probably *C. pulchella*). 3.

Lyncodaphnia. ? *g. et sp.* (Ehippium only). 5.

Camptocerus *sp.* (probably *C. rectirostris*). 5.

Acroperus harpae. 5.

Alona affinis. 1, 13.

A. quadrangularis (and ehippium). 1, 13.

A. costata ? (probably).

A. guttata ? (probably).

A. rectangula. 5.

Leydigia acanthocercoides. 5.

Alonella excisa. 5, ? loc.

A. nana. 5, ? loc.

Pleuroxus *sp.* (perhaps *P. trigonellus*). ? loc.

Chydorus sphaericus. 1, 3.

C. sp. (perhaps *C. ovalis*). 1, 3.

OSTRACODA.

Cytheridea torosa ? 6.

Another ostracod ? *gen. et sp.* 6.

MOLLUSCA.

- Paludetrina stagnalis* Baster. 6.
Cardium edule L. 6.

POLYZOA.

- Plumatella* sp. (statoblasts). 5.

SPONGES.

- Spongilla* sp. Macroscleres and microscleres, 5.

PLANTS.—(I) PHANEROGAMIA.

- Ranunculus lingua* L. achenes. 14, 20, 21.
Castalia alba Greene, fruits. 5.
 Crucifer ? seeds. 20, 21, 22.
Lychnis flos-cuculi L. seeds. 7, 21.
Arenaria trinervia L. seeds. 7.
Stellaria palustris Retz. seeds. 17.
Spiraea Ulmaria L. 21, fruits.
Comarum palustre L. achenes. 17.
Rubus fruticosus L. (One "seed.")
Epilobium sp. anthers and pollen, 21.
Galium sp. fruits. 21.
Valeriana officinalis L. fruits, abundant. 21.
Menyanthes trifoliata L. seeds. 1, 2, 3, 4, 5, 6, 7, 9, 11, 12, 13,
 15, 16, 20, 21, 22.
Solanum Dulcamara L ? seeds. 1.
Lycopus europaeus L. seeds, fairly abundant. 21.
Atriplex patula L. seeds. 7, 8.
Atriplex sp. seeds. 6.
Urtica dioica L. 17 (one seed).
Salix aurita L. ? leaf impressions. 5.
S. repens L. ? leaf impressions. 5.
Betula alba L. 1 (fr.), 3 (fr.), 6 (stems), 7 (stems), 9 (stems), 14
 (stems), 20 (fr.), 21 (fr.).
B. nana L. 21 (fr.)
Corylus Avellana L. Nuts. 3.
Pinus sp. Pollen grains only. 1, 5, 6, 9, 12, 13, 14
Sparganium ramosum, Huds. seeds, 21.
S. simplex Huds. seeds. 2, 6, 20.
S. natans L. One fruit. 2.
Potamogeton natans L. seeds. 5.
P. sp. seeds 8, 22.
Ruppia rostellata, Koch. seeds. 6.
Alisma Plantago L. seeds. 20.
Eleocharis sp. fruits. 20.
Scirpus fluitans L. fruits. 20, 22.
Scirpus sp. fruits. 4, 6.
Carex pulicaris L. fruits. 1.
C. rostrata Stokes. fruits. 3, 14 (? sp.), 17 (many), 20.
C. flava L. fruits 10.
C. sp. (several) fruits. 1, 2, 4, 5, 7, 9, 13, 14, 16, 21, 22.
Phragmites communis Trin. rhizomes. 7, 9, 12, 14, 16.

(2.) CRYPTOGRAMIA.

Fern sporangia. 1, 3, 6, 12, 13, 20, 21, 22.

MOSSES.

Hypnum intermedium.⁶ (fairly common).

H. Richardsoni.⁶

H. giganteum. ? loc.

Hypnum sp. 4, 10, 11, 13, 14, 15, 17.

Sphagnum sp. 3, 6, 9.

FUNGI.

Teleutospores. 1, 9.

CHARACEAE.

Nitella translucens (probably). 5.

The fruit was examined and named by Mr. James Groves, F.L.S., who says "*N. translucens* is a Western European species, and is fairly common in our South Eastern Counties."

THE ESSEX FIELD CLUB—REPORTS OF MEETINGS.

VISIT TO CAMBRIDGE (515th MEETING).

APRIL 1ST TO APRIL 5TH, 1920.

An excursion of five days' duration to Cambridge was arranged for Easter at somewhat short notice, and a small but enthusiastic party of members availed themselves of the opportunity of making or renewing acquaintance with the venerable University town, with its multitudinous objects of interest.

By one or other of the crowded holiday trains on the evening of Thursday, 1st April, the members of the party reached Cambridge, and by 11 p.m. were safely gathered in to the Headquarters, the non-collegiate hostel, Fitzwilliam Hall, in Trumpington Street.

On Good Friday morning the official programme of visits was fittingly inaugurated by a pilgrimage to No. 22, Fitzwilliam Street, where a stone, built in the front wall, informed us that

CHARLES DARWIN

LIVED HERE

1836—7.

that is to say, on his return from his voyage in the "Beagle."

Francis Darwin tells us, in his *Life and Letters of Charles Darwin*, 1887, that his father settled at Cambridge on Dec. 10, 1836. "He was at first a guest in the comfortable home of the Henslows, but afterwards, for the sake of undisturbed work, he moved into lodgings." Charles Darwin himself records that he settled in lodgings at Cambridge [in Fitzwilliam Street] on December 13th, and stayed there three months. He employed his time in looking over the geological specimens which he had collected during his voyage, and it was in this house that he began to prepare his *Journal of Researches*. On March 6, 1837, Darwin left Cambridge for London, where he went into lodgings at 36, Great Marlborough Street.

Later we had pointed out to us the rooms where Darwin "kept" whilst an undergrad., "on the south side of the first court of Christ's, on the west side of the middle staircase, on the first floor."

At 10 o'clock a visit was paid to the ZOOLOGICAL MUSEUM under the guidance of Mr. J. J. Lister, M.A., F.R.S., and of Mr. Foster Cooper, the Superintendent of the Museum, who conveyed the visitors in two parties through the rooms and explained the exhibits. Among the many striking specimens pointed out were the eight eggs of Great Auk which the Museum boasts, also a set-up specimen of this bird and two complete skeletons. A Narwhal with two equally well-developed tusks, both with left-handed spirals, was observed with interest: usually the left hand tusk is the only tooth normally developed, its right hand fellow remaining in a rudimentary condition in the socket. A preparation of *Tatusia novemcincta*, an Armadillo, showing four fœtuses from a single placenta and ovum (the normal arrangement in this animal) attracted considerable attention.

Later in the day Mr. Lister conducted the visitors through his own college (John's), showing them the Hall, the Library, with the original oak book-presses, and the Combination Room with its wonderful plaster ceiling; the Courts of Trinity and Queen's Colleges, and the "Backs," were also visited.

On Saturday a visit was first paid to the BOTANY SCHOOL AND MUSEUM, where the party was received by Mr. Shrubbs, in the regretted absence, through illness, of Professor Seward. Mr. Shrubbs proved an efficient cicerone, and displayed the treasures of his Museum with enthusiasm; he stated that Engler's system of plant classification was that followed in the Museum.

Much interest was shown in the well-displayed specimen of *Welwitschia mirabilis*, one of the Gnetales from S.W. Africa, which develops only two true leaves, following the temporary cotyledons, which leaves continue to grow throughout the entire life of the plant (a century or more), becoming lacerated at their free ends and attaining a length of several feet. The squat stem rests close on the surface of the sandy ground, and bears crowded inflorescences and cones, while a long tap root is sent down to seek moisture at considerable depths. An hemipterous insect, *Odontopus sexpunctatus*, bores in numbers in the tissues of the inflorescences, and almost certainly effects the fertilisation of the plant.

A polished section of the trunk of a Common Elm, *Ulmus campestris*, which was blown down in a storm on October 14, 1881, in the grounds of St. John's College, was inspected; at the time of its destruction the elm was 215 years old, and it was still a vigorous healthy tree.

Specimens of bast fibres from the Lace Tree of Jamaica, *Lagetta lintearia*, one of the Thymelacæ, which form numerous concentric layers interlacing in all directions in the stem, were inspected. They are made into articles of apparel, frills, collars, thongs, etc., after removal from the stem by maceration.

The visitors next proceeded to the BOTANIC GARDEN, where they were welcomed by Mr. Preston, and conducted by him round the rock-garden and through the various houses, noticing many interesting plants which space does not allow us to particularise.

In the afternoon the Town Market was visited, the Round Church,

the Courts of Trinity and Clare Colleges and Trinity Chapel, with its fine statue of Newton by Roubillac. Magdalene College was also visited, and the Hall and Combination Room inspected.

On Sunday most of the party attended the morning service in King's College Chapel, and some also the afternoon service, these enjoying the delight of a divinely-rendered solo from the "Messiah" by one of the choristers. The FITZWILLIAM MUSEUM, with its wealth of pictures, manuscripts, pottery, glass, and Roman and Egyptian antiquities, was also visited, and the chapel of Peterhouse College was inspected by some of the party.

In the early evening a walk through the meadows to Grantchester, to view Mr. J. J. Lister's garden, was undertaken in the rain.

On Easter Monday the day's programme included a visit to the SEDGWICK MUSEUM OF GEOLOGY, where Professor J. E. Marr, Sc.D., F.R.S., welcomed the party and acted as conductor. Professor Marr, in his address, referred to the great imperfection of the geological record, remarking that we possessed only "the last six chapters out of some forty or fifty" which constituted the complete record. He rapidly led us through the entire chain of geological time, as represented by the specimens exhibited in the Museum. Commencing with the oldest organisms yet known, and commenting on the short-lived Graptolites of Ordovician times, which serve as useful zone-determinants for the individual beds, Professor Marr next exhibited the fish-remains contained in nodules of Old Red Sandstone Age, which nodules usually take the rough outline of their included fossils, then spoke of the abundant plant remains of Coal Measure times and of the *Glossopteris* fauna contained in boulder-clays of Permian date in the southern hemisphere, which tell of an Ice Age in that remote period. The lecturer also referred specially to the numerous fossils derived from the Gault and contained in the so-called "Upper Greensand of Cambridge" at the base of the Chalk Series. Coming to more recent deposits Professor Marr exhibited, with pardonable pride, the complete skeleton of *Hippopotamus amphibius* from the Pleistocene river-gravel of Barrington, 5 miles from Cambridge, which has been reconstructed from the numerous bones found in that deposit, though these probably did not all belong to a single individual.

A skull of the Aurochs, *Bos primigenius*, found in Burwell Fen, with a polished neolithic stone axe imbedded in its skull, attracted considerable interest. It was gratifying to hear two Members of our Club, Mr. E. T. Newton and Mr. S. Hazzledine Warren, referred to by Professor Marr in connection with original work done by them.

Passing to the adjoining new MUSEUM OF ETHNOLOGY AND ARCHÆOLOGY, the visitors, in the absence of the Curator, Baron von Hügel, were received by Mr. Coles, and were conducted by him round the exhibits, which are not yet, however, properly displayed.

In the afternoon some of the party visited Corpus, Pembroke, Jesus, Sidney Sussex, Christ's, Emanuel, and Downing Colleges, and the magnificent modern Roman Catholic Church; others were busily preparing for their return journey: and by seven o'clock in the evening all had left for home, except four members who stayed on for an extra day's sight-seeing, when the women's colleges, Newnham and Girton, were inspected, the latter in detail.

NATURE-RAMBLE IN HAINAULT FOREST (516th MEETING).

SATURDAY, 1ST MAY, 1920.

A forest ramble in early springtime, when, as old Chaucer has it,

. Aprille with his shoures sote
The droghte of Marche hath perced to the rote,
.
Whan Zephirus eek with his swete breeth
Inspired hath in every holt and heeth
The tendre croppes,
And smale fowles maken melodye,"

was sure to be welcomed, and over 50 of our Members turned out to taste its joys.

The field-meeting was planned to offer to those participating the three-fold opportunity of studying the flowers, birds and insects of newly-awakened Nature. The President, Mr. R. Paulson, F.L.S., F.R.M.S., acted as botanical referee, Mr. William E. Glegg recorded the birds seen or heard, and Mr. C. Nicholson, F.E.S., led the entomologists present. By invitation Keeper Evan Jones, who has been in charge of the Forest ever since its acquisition as a public pleasaunce, and who has been largely responsible for its development from an arable farm into the present open breezy gorse land and penetrable woodlands, accompanied the party and acted as guide in the thicker portions of the "woody part."

The visitors assembled at Grange Hill station shortly after 2 o'clock, and proceeded along the road to Chigwell Row, and thence across the recreation ground to the Forest. Here the party divided into smaller groups; some devoted themselves to the wild plants of the woods; others, charmed by the birds which were singing all around,

The ousel cock so black of hue,
With orange-tawny bill,
The throstle with his note so true,
The wren with little quill;
The finch, the sparrow, and the lark,
The plain-song cuckoo gray,

gave their attention to the just-retained summer migrants, while yet others sought for water beetles and their larvæ in the Forest pools; or listened attentively to Keeper Jones' account of the rehabilitation of the wilderness and of its *feræ naturæ* which have found their way to it as to a sanctuary. All alike enjoyed the glorious views across the valley of the Thames to Shooter's Hill and the higher ground of Kent.

Tea was taken at the Retreat at Chigwell Row, adjoining the Forest, after which a formal meeting of the Club was held, with the President in the chair, when

Mr. F. J. Lambert, of 35, *Leighton Avenue, Leigh-on-Sea*, and
Mr. W. H. T. Tams, of 8, *Whitta Road, Manor Park, E.12*,
were elected members and three candidates were nominated for election.

The President then called upon the Conductors for reports on the finds of the afternoon.

Mr. Glegg reported that 32 birds had been recorded, of which 11 were migrants ; his list included Nightingale, Blackcap, Redstart, Whitethroat, Lesser Whitethroat, Martin, Swift, Kestrel, Green Woodpecker, and Heron.

Mr. Nicholson and Mr. Hugh Main reported that insects were scarce, no doubt owing to the cold wet weather which was experienced throughout April. Mr. Main called attention to the stridulating powers possessed by the Common Dor Beetle and its larvæ ; and demonstrated same by specimens which he had captured that afternoon.

Mr. Paulson said that some 36 species of plants had been noted during the ramble actually in flower. The rarest form met with was *Cerastium arvense* ; some specimens of *Arum maculatum* were exhibited which well deserved their specific name, since not only the small leaves but also the inner surface of the spathes were beautifully maculated with purple. Mr. Paulson added that a noteworthy find was the lichen, *Chænotheca melanophæa*, var. *flavocitrina*, found that afternoon on an oak trunk in the Forest, which had heretofore only been recorded from Herts and on a single tree in Epping Forest. Mr. Percy Thompson called the attention of those present to the fact that this rare lichen had been made known to science in 1917 by the President himself, and that nobody but he seemed able to find new stations for it.

Votes of thanks were cordially passed to the several conductors and to Keeper Jones for their services, and the visitors then made their way back to Grange Hill station for their homeward trains.

VISIT TO DANBURY AND LITTLE BADDOW (517th MEETING).

SATURDAY, 29TH MAY, 1920.

This meeting was held in response to a kind invitation from our members, Mr. and Mrs. A. E. Briscoe, to visit them at "The Hoppet," Little Baddow, the opportunity being taken to explore, chiefly from a botanical point of view, the beautiful series of commons and woodlands of the Danbury district. The Conductors were Mr. Briscoe, the President (Mr. R. Paulson), the Hon. Secretary (Mr. Percy Thompson), and Mr. F. W. Thorrington.

Some thirty members assembled at Chelmsford Railway Station at 10 o'clock, when a private motor omnibus was in attendance to convey the party to Danbury.

On arrival at Danbury the church was first visited. The present building dates from the 14th century and contains three of the eight wooden effigies which the county possesses ; they are probably memorials to members of the St. Clere family. The wooden roof of the northern aisle is an interesting piece of early 15th century work, and has upon it carved wooden bosses, which seem to be portraits of Richard II. and Henry IV. and their wives.

The party walked past the remains of the Old Danish Camp on to Danbury Common ; from the Camp a magnificent view southwards, over the valley of the Crouch to the Rayleigh hills, was enjoyed.

From Danbury Common, by footpaths and bye lanes, Woodham Walter

Common was next reached. This is an interesting piece of ground intersected by deep valleys, and largely covered with scrub oak.

A piece of adjoining woodland known as the "Poors Piece," belonging to the Little Baddow Parish Council, was also visited. It is about 10 acres in extent, and is regularly cut for fuel, each section being cut at about 10 year intervals. Thence by field paths, Lingwood Common was reached.

Many interesting plants were met with during the six-mile ramble. *Convallaria majalis* occurred in abundance on the heaths, but did not appear to flower freely. *Geranium pyrenaicum* and *Corydalis claviculata* the pretty little "Climbing Fumitory," were frequent, and other noteworthy finds were *Coronopus didymus*, *Potentilla argentea*, *Alchemilla arvensis*, and the rare fern, *Lastrea Thelypteris*, which was abundant in one of the bogs. The early season was evidenced by the profusion of Dog Rose and Honeysuckle, both in full bloom.

An interesting lichen, *Lecidea quercea*, in good fruit, was growing on an oak-trunk at Riffham's Park, and was secured for the Club's herbarium.

From Lingwood Common the party traversed woodlands and field paths to Little Baddow Church, which dates mainly from the 14th century, although portions of the walls are much older. Roman bricks have been used in quoins and arches. Here are two more wooden effigies of a man and a woman, in civilian dress, of late 14th century date, possibly two members of the Filiol family, who were once Lords of the Manor. There is a fine Jacobean tomb to Sir Henry Mildmay, of "Great Graces."

The Old Congregational Meeting House erected in 1707 by the Barrington family was then inspected; this is probably the oldest Nonconformist place of worship in the county, and is an excellent example of the workmanship of the period. A recent discovery of some antiquarian interest was pointed out, the name

ST. BRUCE,

1740,

having been found scratched on the door, under the paint-work, during redecoration.

Little Baddow is memorable for its association with John Eliot, "the apostle of the Indians" (1604-1690), a native of Essex, who stayed here for a time with the celebrated Thomas Hooker. In 1631 he sailed in the "Lyon" for America, and settled as minister at Roxbury, Mass., where he remained until his death. Eliot regarded the Indians of New England as the descendants of the Lost Tribes of Israel, and he undertook the translation of the entire Bible into the tribal dialect of the Natick Indians, a herculean task which he completed by 1663, and the volume was printed at Cambridge, Mass., in that year. He also published an Indian grammar. John Eliot's Indian Bible was the first ever printed in America; the Natick dialect has since become extinct.¹

The party then proceeded to "The Hoppet," and was most hospitably received by Mrs. Briscoe and her daughter. Tea was taken on the lawn in the welcome shade of some lofty trees.

After tea a short Meeting (the 517th) of the Club was held, with the President in the chair, when the following ladies were elected members:—

Mrs. Kate Paulson, of "Glenroy," Cecil Park, Pinner, Middlesex.

1. For further biographical details of John Eliot, see *Journ. of Proc. Essex Field Club*, iv., 1885, p. xxxvi.

Mrs. E. FOX, of "*Hispar*," *Harrow Drive, Romford*.

Miss M. GOLDWIN, M.A., of 8, *Rectory Road, Walthamstow, E. 17*.
and three candidates were nominated for election.

The Hon. Secretary referred to the recent bereavement of the Club's Patron, H.R.H. the Duke of Connaught, and said that the President and he had signed, on behalf of the members of the Club, a respectful letter of condolence with His Royal Highness, who had graciously acknowledged same.

The President proposed the hearty thanks of the Club to Mr. Briscoe for the charming ramble which they had enjoyed under his leadership, and to both Mr. and Mrs. Briscoe for their kind hospitality that afternoon. This proposal was carried by acclamation, and Mr. Briscoe replied suitably.

A very pleasant hour or so was then spent in inspecting our host's garden.

The return to Chelmsford was made by motor omnibus through bye lanes and roads, in good time to catch the 8.7 train back to London.

VISIT TO THE GRAYS CHALK QUARRIES (518th MEETING).

SATURDAY, 26TH JUNE, 1920.

This excursion was planned to afford an opportunity of studying the Botany and Geology of the extensive chalk pits belonging to the Grays Chalk Quarries Company Ltd., permission to explore which had been kindly given by the Directors of the Company.

The official party travelled to Grays by the 10.17 a.m. train from Fenchurch Street; other Members, unable to leave town earlier, joined the party at the quarries in the afternoon. Mr. E. T. Newton, F.R.S., the President, and the Honorary Secretary, were the conductors.

The Pits consist of a lower Chalk quarry and an upper pit of Thanet Sand, overlaid by Thames Valley deposits which are worked for brick-earth.

The upper pit was first visited, and plant-collecting was assiduously pursued by the visitors. The large Greywethers lying on the floor of the upper pit, which exhibit beautifully mammillated surfaces, and one of which measures 9 ft. 7 in. in length, were inspected, and their origin discussed; lunch was likewise discussed at this juncture.

The site of the now filled-in Dene Hole, discovered in January last,² was inspected, and Mr. Percy Thompson gave a brief account of the discovery.

By devious and somewhat difficult routes the visitors made their way down the face of the Chalk cliff to the floor of the lower pit, which is overgrown, except for the paths made by the quarrymen to and from the working face of the Chalk, by a scrub of young Sallow and Birch trees, with an admixture of Sycamore, Hawthorn, Ash, Elder, Dogwood, Clematis and *Rubus cæsius*. In the older parts of the extensive quarry, the chalk-loving Ash was seen to be forming an ash-wood.

² ESSEX NATURALIST, xix, p. 154.

All parts of the quarry were found to abound with a rich assemblage of plants of characteristic Chalk *facies*. In view of the very restricted area of the Chalk outcrops in South Essex, it will be useful to give a list of the more characteristic plants recorded on the excursion, as follows :

<i>Clematis vitalba</i> .	<i>Centaurea scabiosa</i> .
<i>Diplotaxis tenuifolia</i> .	<i>Cichorium Intybus</i>
<i>Lepidium Draba</i> .	<i>Helmintia echioides</i> .
<i>Reseda lutea</i> .	<i>Crepis capillaris</i> .
<i>Linum catharticum</i> .	<i>Lactuca virosa</i> .
<i>Medicago sativa</i> .	<i>Leontodon hispidus</i> .
<i>Melilotus altissima</i> .	<i>Blackstonia perfoliata</i> .
<i>M. alba</i> .	<i>Centaureion umbellatum</i> .
<i>Trifolium procumbens</i> .	<i>Cynoglossum officinale</i> .
<i>Lathyrus nissolia</i> .	<i>Verbascum thapsus</i> .
<i>Epilobium angustifolium</i> .	<i>Linaria vulgaris</i> .
<i>E. parviflorum</i> .	<i>Orobanche minor</i> .
<i>Fœniculum vulgare</i> .	<i>Origanum vulgare</i> .
<i>Daucus carota</i> .	<i>Calamintha acinos</i> .
<i>Dipsacus sylvestris</i> .	<i>Populus canescens</i> .
<i>Conium maculatum</i> .	<i>Listera ovata</i> .
<i>Smyrniium olusatrum</i> .	<i>Orchis pyramidalis</i> .
<i>Erigeron canadensis</i> .	<i>O. latifolia</i> .
<i>E. acris</i> .	<i>Ophrys apifera</i> .
<i>Inula squarrosa</i> .	<i>Trisetum flavescens</i> .
<i>Artemisia vulgaris</i> .	<i>Sclerochloa rigida</i> .
<i>Carduus crispus</i> .	<i>Festuca ambigua</i> .

The Marestail (*Hippuris vulgaris*) was found growing profusely, in a mass nearly 60ft. long by 25ft. across, in a dried-up lime pit ; a notable sight.

Mr. F. T. Vallins records the following as among the more interesting BEETLES found by him on the excursion and at subsequent visits to the quarry :—

- Harpalus puncticollis* Fairm (fairly common).
- Staphylinus stercorarius* Ol. (one specimen only, under stones.)
- Sphæroderma cardui* Gyll. (common.)
- Crepidodera transversa* Marsh (common.)
- Oedemera nobilis* Scop. (abundant on flowers in one spot only.)

This beetle prefers Chalk, but is locally common on other soils.

**Oedemera lurida* Marsh (almost exclusively a Chalk beetle).

**Apion viciæ* Payk (very common, on Leguminosæ).

**A. meliloti* Kirby (do. do.)

**A. tenue*, Kirby (do. do.)

A. vorax, Herbst. (one specimen, on Sallow).

A. simile, Kirby (very common, on Birch).

Altogether 15 species of the genus *Apion* were found, no doubt owing to the abundant growth of various Leguminosæ.

The species marked * appear to be new records for the county, as they do not appear in the List of Colcoptera given in the *Victoria History of Essex*, 1903.

The larvæ of the Cinnabar Moth were found feeding on Ragwort in the quarry.

When all the scattered members of the Party were gathered together a short Meeting of the Club was held in the pit, with the President in the Chair, when

Mrs. Janet E. F. Howard, }
 Mr. Bernard F. Howard, } of *Firbank, Loughton*, and
 Mr. William E. Glegg, of *The House, Albion Brewery, Whitechapel Road, E.1*,
 were elected Members, and one candidate was nominated for election at the next meeting.

Mr. Newton then gave a brief account of the mammalian remains which have been found in such abundance in the Pleistocene deposits of the Grays and other neighbourhoods, and Mr. Thompson added some remarks on the physical geology of the district.

The President gave an account of the more noteworthy plants which had been met with during the excursion.

Tea was taken in the town at 4.30, and the visitors returned to London by the 5.35 o'clock train, after a very successful and enjoyable day.

FIELD MEETING IN THE DAGENHAM DISTRICT (519th MEETING).

SATURDAY, 18TH SEPTEMBER, 1920.

In spite of continuous rain throughout the morning, which threatened much personal discomfort, having regard to the rough nature of the ground to be traversed, a faithful band of seventeen Members duly paraded at Dagenham Dock station at 2.5 o'clock, as per the circular calling the meeting. The object of the excursion was a botanical one, to investigate a rampant tangle of phanerogamous plants growing upon waste ground bordering the Thames River bank.

On leaving the station, the party skirted the large sheet of water known as Dagenham "Gulf," or "Lake."

Dagenham Breach, the last and greatest of several inroads of the Thames since the building of the river-wall, was occasioned on 17 December 1707, by the coincidence of an extremely high spring tide and a violent N.E. wind, probably added to the neglect or ignorance of an unqualified marsh-bailiff, one Edward Osborne, who was in charge of the river-wall. Of small extent at first, but not attacked with adequate promptitude and fore-sight, the breach in the wall, which might have been stopped, it has been estimated, by the shrewd expenditure of £40, repeatedly re-opened, notwithstanding various repairs, and was not finally stopped until 1721, after the enactment of a special Act of Parliament and the outlay of scores of thousands of pounds.

During the repeated inrush of water at high tides not only was the Breach constantly widened and deepened, but thousands of tons of marsh soil, scoured out through the gap at ebb tides, formed mudbanks in the river and seriously interfered with navigation. By the year 1716, it was estimated that the drowned land occasioned by the Breach amounted to

between 1,200 and 1,300 acres, and it extended as far as or beyond the village of Dagenham, two miles distant from the river bank.

The present-day acreage of "Dagenham Gulf" is some 40 acres, and it is much frequented by anglers.¹

In the near neighbourhood of the "Gulf" is the derelict, choked-up channel of the "Romford Canal," designed in the '70's of last century to convert the Essex market town, nearly five miles distant, into a river port, but never completed beyond half-way.

The land lying between the "Gulf" and the river has been heightened by the accumulation, during many decades, of enormous quantities of rubbish, brought here by barge from London; and on the rough surface of this huge "tip-heap," which extends for fully half a mile along the river front, forming a low cliff, some 7 feet high, a heterogeneous assemblage of wild and alien plants has had free opportunity to develop, and presents an interesting subject of botanical study.

A striking effect is produced by a jungle of the tall *Heracleum giganteum*, 8 feet or so in height, extending over hundreds of yards of ground, whose stout stems and noble foliage presented a strangely tropical aspect.

The following plants, among others, were noted by the botanists of the party:—*Erigeron Canadensis*, *Saponaria officinalis*, *Medicago falcata*, *M. sativa*, *Melilotus officinalis*, *M. alba*, *Oenothera biennis*, *Angelica sylvestris*, *Pastinaca sativa*, *Dipsacus sylvestris*, *Artemisia vulgaris*, *Senecio viscosus*, *S. erucifolius*, *Cichorium Intybus*, *Lactuca virosa*, *Helminthia echinoides*, *Aster tripolium* (the rayed form), *Atropa belladonna*, and the aliens *Sisymbrium pannonicum*, *Heracleum giganteum*, and *Lycopersicum esculentum* (tomato), also many self-sown Apple, Plum, and Elder bushes.

Mr. Glegg observed the following birds on or about the "Lake":—Kestrel, Blackbird, Redbreast, Wren, Skylark, Meadow Pipit, Linnet, Reed Bunting, Swallow, Martin, Sand Martin, Starling, Coot, Moorhen, Green Sandpiper (a single bird and a party of four), and Black-headed Gull.

From this interesting spot the party proceeded across country, partly by road and partly by field-path, to Dagenham Village, some two miles distant, where at the "Cross Keys" Hotel, tea was taken, after which a formal meeting (the 519th) of the Club was held, and Captain F. Gidney, of *Gillwell Park House, Sewardstone*, was elected a Member.

A move was then made across the road to the parish church (St. Peter and St. Paul), where the visitors were received by the priest-in-charge, the Rev. G. Jones, who showed the 15th century Urswick tomb and other interesting monuments, and who gave an account of the partial rebuilding of the church at the beginning of the 19th century, and the subsequent alterations.

After a vote of thanks to Mr. Jones, the party made its way along the village street to Dagenham station, where the 7.21 o'clock train for London was caught.

¹ Dagenham Breach was visited by the Club on 23rd July, 1892, and an interesting account of it was read by Mr. Walter Crouch on that occasion (see *Essex Naturalist*, vi., p. 155).

FUNGUS FORAY IN EPPING FOREST (520th MEETING).

SATURDAY, 16TH OCTOBER, 1920.

The Club's annual Fungus Foray has grown to be one of the important scientific functions of the year, and this year's meeting was no less successful than its predecessors, at least 140 Members and friends attending. As on former occasions, representatives of other Societies were present by invitation of the Club.

The route chosen for the morning party was from Chingford to Highbeach, and proved to be justified by the excellent yield of specimens. Assembling at Chingford station at 11.4 o'clock, the party crossed Chingford Plain and entered the woodlands, soon breaking up into smaller groups, following one or other of the several Conductors, according as their interests lay with the larger fungi or with the "myxies." The referees, who soon had their hands full in dealing with the specimens brought to them for identification, were:—

For the Basidiomycetes and Ascomycetes: Miss A. Lorrain Smith, F.L.S., Mr. J. Ramsbottom, F.L.S., Mr. F. G. Gould, and Mr. Arthur A. Pearson, F.L.S.

For the Myxomycetes: Miss Gulielma Lister, F.L.S.

The afternoon party assembled at Loughton station at 2.37 o'clock, and made its way by a shorter route to the Headquarters, the Roserville Retreat at Highbeach, collecting *en route*. At the Headquarters the specimens collected were arranged by the referees on long tables and duly named, and made a fine display.

Tea was taken shortly after 5 o'clock, following which a short meeting (the 520th) was held, with the President, Mr. R. Paulson, F.L.S., F.R.M.S., in the chair. The following ladies were duly elected members of the Club:—

Mrs. Lilian M. Hicks, of *Runsell Green, Danbury*.

Miss Margaret M. Gemmell, of 10, *Hampton Road, Forest Gate, E.7*, and nine candidates were nominated for election.

The President referred to the presence with the party of our distinguished Honorary Member, Dr. A. Smith Woodward, President of the Linnean Society, and welcomed in the name of the Club the members of other societies present. He then called in turn upon our Referees for their reports on the day's finds.

Miss Lister reported that no fewer than 29 forms of myxomycetes had been found during the foray, and mentioned as of especial interest and rarity in the Forest, *Cribraria vulgaris* and *Stemonitis splendens*. The full list recorded is as follows:—

<i>Badhamia utricularis</i> .	<i>D. nigripes</i>
<i>Physarum nutans</i> .	<i>Stemonitis fusca</i> .
" " <i>var. robustum</i> .	<i>S. ferruginea</i> .
<i>P. viride</i> .	<i>S. splendens var. flaccida</i> .
<i>P. verum var. iridescens</i> .	<i>Comatricha nigra</i> .
<i>Fuligo septica</i> .	<i>C. typhoides</i> .
<i>Craterium minutum</i> .	<i>C. pulchella</i> .
<i>Leocarpus fragilis</i> .	<i>Lamproderma scintillans</i> .
<i>Diderma effusum</i> .	<i>Cribraria vulgaris (= aurantiaca)</i> .
<i>Didymium squamulosum</i> .	<i>Dictydiaethalium plumbeum</i> .

Trichia persimilis.

T. varia.

T. decipiens.

T. Botrytis.

Arcyria denudata.

A. incarnata.

A. cinerea.

A. pomiformis.

A. nutans.

Mr. Ramsbottom, who followed, described the sclerotia of fungi, and spoke of the audible hissing sound made by the ejection of the spores of ascomycetous fungi from the asci.

Mr. Gould spoke of the classification of the larger fungi, and made some humorous remarks on the scents of fungi as an aid to identification.

Mr. Pearson referred to *Stereum purpureum* as being the cause of "silver leaf" in plum and other fruit trees, and announced that approximately 150 species of fungi had been recorded during the day's foray. Included in this total were the following new records for the Forest:—

Lactarius circellatus Fr.

Flammula ochrochloria Fr.

Corticium roseo-cremeum Brs.

Corticium praetermissum (Karst) Bres.

Corticium sphaerosporum R. Maire.

The last is new to Britain, and will be described later in the Transactions of the British Mycological Society.

The President proposed a vote of thanks to the referees, which was heartily accorded by the meeting.

Mr. T. Johnston Farrell, B.A., LL.B., as representing the School Nature Study Union, expressed his thanks to the Club for the invitation extended to his members to join the foray.

Mrs. Boyd Watt seconded, on behalf of the members of the Gilbert White Fellowship.

Miss A. Hibbert Ware, F.L.S., President of the Toynbee Natural History Society, endorsed the expression of thanks in the name of her Society.

The proceedings then terminated, but sufficient daylight yet remained, thanks to this year's prolongation of "summer-time," to enable those present to make a further inspection of the specimens displayed upon the tables.

Essex Records of the Green Sandpiper (*Totanus ochropus*) in 1920.—On 29th August I saw several Green Sandpipers at Pitsea. At the Club's field-meeting at Dagenham on 18th September I flushed a single bird, and later a party of four. In Epping Forest on 5th December, I had a good observation of a Green Sandpiper by the small pond on Fairmead Bottom: it was so close that it could be identified without using the binoculars, the white of the rump and tail being conspicuous. On noticing me, the bird rose in the air with snipe-like flight, uttering its loud whistling call-note, and disappeared in the direction of Long Hills.—W. E. GLEGG.

THE BIRDS OF WEST THURROCK MARSH.

BY PERCY W. HORN.

IF we take a map of Essex and look at the southern boundary of the county we shall note that, midway between Purfleet and Grays, the river makes a sharp bend, enclosing a tract of land which is roughly in the form of an obtuse-angled triangle, having for its base or N. side the L.T. and S. Railway, and for its remaining sides the River Thames.

Practically the whole of this area is below sea-level, and doubtless at one time was a huge salt marsh.

It is still termed a "marsh" but its low-lying fields, protected from the encroachment of the river by a sea-wall, and intersected by numerous dykes, are now grazing land, occupied by flocks of sheep and cattle.

Two small corners, however, have escaped the reclaiming hand of man and still retain something of their old-time character. The first corner is a swampy reed-bed of considerable size, lying inside the sea-wall towards the Purfleet end of the triangle. This area lies too low for drainage, and it will probably remain a swamp until enterprising authorities begin to dump the rubbish of the metropolis into it.

The other small corner lies at the apex of the triangle where it juts out into the Thames. On the map it is marked Stone Ness. More commonly it is called "the Beacon," because of the hideous skeleton lighthouse which disfigures it.

Here the sea wall, on account of the presence of a creek with numerous ramifications, turns landward right across the promontory until it reaches the other side, leaving an extent of some fifty acres exposed to the mercy of the tides. Normally the water does not rise above the level of the creek, but at spring tides the whole salting is inundated to a depth of two or three inches right up to the base of the sea-wall. Lying at some considerable distance from habitations, the salting is seldom visited except by a casual collector of driftwood, hence it is not surprising to find that migratory shore-birds using the Thames estuary have come to look upon this little salting as a pleasant oasis in the desert of cement factories which lies on either side.

Commonest of the birds on the marsh are the Gulls.

They seldom alight on the salting, but they have a most

convenient habit of taking a short cut across the promontory, and it is thus easy for the ornithologist to get a good view of them, particularly if a strong S.W. wind is blowing.

I once had the pleasure of noting five species in one day, viz., Black-headed Gull (*Larus ridibundus*), Common Gull (*L. canus*), Herring Gull (*L. argentatus*), Lesser Black-backed Gull (*L. fuscus*), and Great Black-backed Gull (*L. marinus*). This was on a bitterly cold and boisterous day in January. Incidentally, I would remark that the larger species of gulls appear to be more common at Thurrock and Purfleet in January than in any other month, and, providing that the weather conditions are as described, it is quite a common occurrence to see a fine adult Black-backed Gull battling its way against the wind within twenty yards of the observer.

Towards evening (3.45 p.m. till dusk, in January), the interesting spectacle of the gulls' homeward flight may be seen from this point. High overhead they wing their way in extended wedge formation down the river to their roosting place, the larger species in small parties numbering from three to a dozen, and the Black-headed Gulls in bands which may number anything from twelve to fifty. I am of opinion that every gull haunting the river from Stepney to Purfleet passes over Stone Ness each evening. I can give no estimate of their number, but the passage of small parties is practically continuous during the period of time mentioned.

A specimen of *L. ridibundus* which I examined in October 1905, contained a great number of small crustaceans (? *Gammarus* sp.)

In the first week of September 1905, I observed a small party of about a dozen Terns hovering and dipping over the water E. of the lighthouse. The distance was too great to admit of definite identification, but the call-note and actions of the birds were unmistakably those of *Sterna*. It would be interesting to know what they were feeding on. The Little Goby (*Gobius minutus*) and the Ditch Prawn (*Palæmon varians*) are invariably present in the little pools left by high tide on the saltings, hence the supposition is admissible that these ground-loving fish and crustaceans come to the surface of the up-flowing tide and possibly attract the Terns.

I have personally noted the following ducks:—Mallard

(*Anas boscas*), Teal (*Nettion crecca*), Wigeon (*Mareca penelope*), Tufted Duck (*Fuligula cristata*), Scaup (*Fuligula marila*.)

The Mallard breeds commonly on the Essex fresh-waters, hence it is a frequent visitor to the salting at evening flight-time. Belated Wigeon and Teal may frequently be flushed from the creek in early morning, usually in pairs. The Teal seems to prefer the ramifications or "rills" of the creek to the muddy entrance. A pair of Wigeon procured here in December 1920, shewed evidence on the plumage of having been in this smoky neighbourhood for some time, but most of the *Anatidae* are stragglers from down the river.

I have only been able to definitely identify the Scaup on one occasion (October 1905). The bird, a female, is now in the Stepney Borough Museum. Doubtless this marine species is of more frequent occurrence than is commonly supposed.

The commonest wader is the Dunlin (*Tringa alpina*). Dunlins are present in small numbers on the mud-banks from September to March. During severe weather their numbers are augmented, and I have seen them so numerous over the flat towards Purfleet, as to give the impression of a drifting smoke-cloud.

The Redshank (*Totanus calidris*) and Curlew (*Numenius arquata*) occasionally visit this district, but are not common. I noted a party of seven Curlew feeding near the mouth of the creek early one morning, on October 19, 1905, and saw odd birds during the winter of 1919-20.

Small shore-crabs (*Carcinus mœnas*), a favourite food of the Curlew, abound round the base of the lighthouse. I have not found them higher up the river.

The Common Sandpiper (*Totanus hypoleucus*) is a regular visitor to the creek on autumn migration, and I have once seen the Green Sandpiper (*T. ochropus*), a somewhat erratic visitor everywhere, in the same place.

From mid-October to the end of February one is tolerably certain of flushing a Common Snipe (*Gallinago cœlestis*) from the "rills." The birds seldom fly far, but after circling high overhead, return, dropping like a stone into their favourite haunt.

A specimen of the Common Snipe now in the Essex Museum was one of a small party (presumably of the same species) which was flying over the river at 11 a.m. The circumstance is somewhat unusual, for the Snipe usually skulks by day and is strictly speaking not gregarious.

The Jack-snipe (*Gallinago gallinula*) puts in an appearance in hard weather. Its favourite haunts are the ditch running parallel to the sea-wall, and that lying east of the lighthouse. The Jack-snipe is an inveterate skulker. During an exceptionally high tide in the winter 1919-20, I saw two birds driven out of the ditch near the lighthouse by the rising water. Ten minutes previously I had searched this ditch for Jack-snipe but without success.

Small parties of Golden Plover (*Charadrius pluvialis*) visit the saltings and foreshore during the first two days of snowy weather. Prolonged snow drives these (and the following species) away, presumably to a more congenial feeding ground. I am informed that the Golden Plover was present on December 13th, 1920.

The Lapwing (*Vanellus vulgaris*) commonly arrives in large numbers from the inland pastures to the north at dusk, departing before daybreak. An early morning examination of the mudbanks (tide permitting), will reveal their footprints in thousands. In hard weather when the frost seals the pastures for the greater part of twenty-four hours, these birds visit the foreshore at all hours of the day. They appear to be most plentiful in November and December.

A most interesting visitor is the Hooded Crow (*Corvus cornix*). It is not common, and I have never seen other than individual birds. They do not appear to associate with the numerous foraging rooks which come over from the quarry wood at Purfleet.

The Kingfisher is a regular winter visitor to the creek and foreshore. The abundance of *Gobius minutus* probably accounts for the bird's presence. The sluice-gate midway between Thurrock church and the lighthouse bears unmistakable traces of being a favourite resting place.

The Grey Wagtail (*Motacilla melanope*) sometimes visits the creek in winter, but it is more frequently seen in the ditches on the land-ward side of the wall.

The Rock Pipit (*Anthus obscurus*) is invariably present in the "rills" throughout the winter. It has a duskier and more bulky appearance than the Meadow Pipit (*A. pratensis*), and to my mind is a typical bird of the mournful saltings.

An immature specimen of *Phalacrocorax carbo* or *P. graculus*

haunted this stretch of the river in 1906. I saw the bird (presumably the same bird) twice in December of that year. On the last occasion it passed within forty yards. I believe *Phalacrocorax* frequently comes up the river during the winter. I observed it at Tilbury on the 2nd and 13th December, 1920.

The Barn Owl (*Strix flammea*) roosts (and possibly breeds) in Thurrock church. I have seen it beating along over the rough herbage near the sea-wall at dusk.

The most interesting member of this family noted was the Short-eared Owl (*Asio accipitrinus*) on October 24, 1920. The writer, with four companions, put up a strange bird from the marsh at the back of the sea-wall. None of the party were certain of the bird until it turned and shewed the characteristic blunt head of an Owl. It was stalked and flushed three times, and on one occasion, by dint of careful manœuvring, it was driven low over the heads of three observers, who had no difficulty in noting the yellow eyes, and other prominent features.

The bird took refuge on the salting near the lighthouse, but was not allowed to remain in peace very long before it was espied and mobbed by a party of rooks. When last seen it was mounting high over the river pursued by one of its sable persecutors.

As a bird-oasis West Thurrock marsh will soon be a thing of the past. In 1919 I heard rumours of a prospective factory to be erected there, and later sundry small but significant pegs were noticed in the ground near where the owl was flushed. Is this little corner of Essex marshland also going?

Additions to the Club's Museum.—Several valuable sets of British Lichens have recently been added to the Essex Museum at Stratford. These include 80 "*Lichenes rarissimi*" collected by Charles Lorbalestier, chiefly in Ireland; "150 British Lichens collected by the Rev. W. A. Leighton"; and nine Fasciculi of British Lichens (in all, 360 specimens) issued by Lorbalestier under the title of *Lorbalestier's Lichen-Herbarium*. These have been acquired by purchase from the widow of the late Rev. W. Johnson, a well-known student and collector of these plants. In addition, Mrs. Johnson has kindly given 32 odd specimens of lichens to the Museum.—PERCY THOMPSON.

ÆNEAS MACINTYRE: A FORGOTTEN ESSEX BOTANIST.

BY MILLER CHRISTY, F.L.S.

FOR some years past, I have been puzzled as to the identity of this man, who "flourished" (as the term is) during the second quarter of last century. My interest in him arose from the fact that he was evidently a man of good standing and education, possessing considerable attainments as a botanist and in other ways, and that he had clearly some connection with Essex. Yet I have failed completely, thus far, to learn anything as to his origin, personality, occupation, and end. Messrs. Britten & Boulger, whose *Biographical Dictionary of British and Irish Botanists* is usually so helpful in such a matter, give none but the most meagre information in regard to him.

The earliest fact connected with him which I have been able to ascertain is that, on 19th April 1825, when he was living at Stockwell Park, Surrey, he was proposed as a Fellow of the Linnean Society, his proposers being Thomas Bell, William Kent, R. Taylor, and G. E. Bitcheno. He was duly elected on the 1st November following. Thereafter, his name appears frequently in the Minute Books, as having received permission to borrow books from the Library, and he is known to have remained a Fellow for nearly twenty years. During that period he changed his place of residence several times, as shown by the successive annual Lists of Fellows. Thus, he lived successively at Notting Hill (1829-31), Bouverie Street, E.C. (1832), and West Ham, Essex (1840). For this information, I am indebted to the kindness of Dr. B. Daydon Jackson, the General Secretary of the Linnean Society.

Some seven years later, in 1832, we find him publishing a small work containing *An Examination of the "Official Relative Lists of Boroughs" and of the Plan on which it is constructed* (London, Hatchard & Son, 16 pp., dy. 8°, 1832). The matter in it consists of some remarks concerning the rating or taxation of Boroughs, which the author had submitted to Lord Liverpool, then Prime Minister, but apparently without result. It is a small and very abstruse work, full of mathematical formulæ.

Four years later, in 1836, he published a rather larger work

—*Etymotonia, containing Principles of Classical Accentuation, intended as a Guide to the right Pronunciation of Greek and Latin words and of all Scientific Terms, &c., &c.* (London, 140 pp., fcp. 8°, 1836). The work, though now completely forgotten, I believe, appears to be extremely well done and authoritative. It shows its author to have been a very accomplished Latin and Greek scholar.

In 1836, on the formation of the Botanical Society of London, MacIntyre became an Original Member and, on 29th November, he was elected a Member of Council (see its *Proceedings*, i., pp. 16 and 101: 1839). On this occasion, he was described as “LL.D., F.L.S., VP.M.S.L.” By what academic body, his degree of Doctor of Laws had been granted to him, I have failed to ascertain; but it was neither the University of Cambridge nor that of Edinburgh. I had supposed that the Society, indicated by the letters “M.S.L.” of which he was Vice-President, was the Microscopical Society of London, founded in 1839; and now the Royal Microscopical Society; but our member, Mr. D. J. Scourfield, who is one of its Hon. Secretaries, and has been good enough to make enquiries, informs me that MacIntyre’s name does not appear on its roll of Fellows. Nor does it appear to have been the Medical Society of London (founded 1773); for Mr. George Bethall, the Registrar of that Society, has kindly searched its list of members without finding MacIntyre’s name thereon.

On the 1st December in the same year, he read before the Botanical Society “A Notice of Plants growing spontaneously on and about Warley Common, in Essex” (printed in *Proceedings*, i., pp. 16-21). On the 15th, he “communicated some further remarks” on the same subject, but these were not printed separately. This paper is full of botanical interest for us to-day, as showing the vast changes which have taken place in both the physical condition and the flora of Warley Common since MacIntyre wrote just eighty-four years ago. Further, his matter proves him to have been as good a botanist as he appears to have been a mathematician and a classical scholar. He enumerates 701 species of plants, belonging to 340 genera, as having been found by him growing on or around the Common in question. Among other plants now scarce or completely extirpated he mentions *Fritillaria meleagris*. The chief point

of interest in the paper is, however, its allusion to a boggy wood on the eastern side of the Common, in which grew (he says) *Osmunda regalis*, whose large and beautiful fronds—"the nearest British approach to the palms of the South—rise in thousands in the interior of this otherwise uninteresting wood." To-day, it may be doubted whether a single genuinely-wild plant of *Osmunda* grows within the bounds of the County of Essex; for the plant has been completely exterminated, I believe, from its former habitats in the woods around Danbury and Woodham Walter and in Epping Forest, where it once grew abundantly. Curiously enough, Gibson utilized, in his *Flora of Essex* (1862), none of the records given in MacIntyre's paper. Why this was, I cannot imagine; for it is clear (see *op. cit.*, p. xxii.) that Gibson knew of its existence.

Apparently, this paper was the only original contribution to Natural Science MacIntyre ever published. At all events, no paper by him (not even this), is given in the Royal Society's great *Catalogue of Scientific Papers, 1800-1863* (1870).

What MacIntyre's connection with the Warley district may have been I know not. I had surmised that he might have held some such post as that of chaplain, tutor, or secretary in the household of Lord Petre, at Thorndon Hall; but Miss Willmott, of Warley, who has been good enough to institute enquiries, has failed altogether to learn that any man of his name ever held any post therein. Yet the thoroughness of the article suggests that his acquaintance with the Common and its flora was due to something more than a mere holiday visit.

At the meeting of the Botanical Society, held on 20th April 1837, MacIntyre occupied the chair.

MacIntyre was a "Compounder" at the Linnean; and, as is often the case with such, the Society never knew what became of him; but he was lost sight of there after 1843. Messrs. Britten & Boulger seem, however, to have had evidence (the nature of which they do not disclose) that he was still living as late as 1860.

Can any member supply further biographical matter regarding him?

**THE CORRESPONDING SOCIETIES'
COMMITTEE OF THE BRITISH ASSOCIATION,
CARDIFF, 1920.**

REPORT OF THE CLUB'S DELEGATE, JOSEPH WILSON, F.R.M.S.

Presented 30th October, 1920.

THE British Association held its 88th Annual Meeting at Cardiff on August 23rd-28th, 1920, when Professor W. A. Herdman, F.R.S., was elected President for the year. He delivered his Presidential Address on the evening of the 24th, taking for his subject, "Life in the Ocean," although the various Sections held their meetings from 9-30 in the morning of that day. Hitherto, the President's address had been the first official act in the programme, and much surprise was manifested by members who arrived on the Tuesday when they found that the Presidents of Sections had already delivered their respective addresses in that forenoon. The first meeting of the Conference of Delegates was held on Wednesday, August 25th, at 2 p.m., when the President of the Conference, Mr. T. Sheppard, M.Sc., of Hull, took the chair, Mr. T. W. Sowerbutts was elected Vice-President, and Mr. W. Mark Webb, the Hon. Secretary.

Mr. Sheppard took as the subject of his address "The Evolution of Topographical and Geological Maps," and he exhibited a large selection of Maps on the walls of the Conference Hall. Mr. Sheppard, being an experienced collector, had been asked a few years ago by the Geological Society of London to prepare a catalogue of British Geological Maps, a work on which he is still engaged; he thought therefore that the result of his collecting would be a suitable subject for his address, and of interest to the delegates.

The first map to which he referred was Moll's New Description of England and Wales, dated 1724; this was in 50 sheets, 10" \times 7½". The second map was by the same author, of the Roads of the South Part of Great Britain, called England and Wales, published about 1729. On the margins of the various sections of these maps curios relating to the district are engraved, evidence of changes due to coast erosion, and alterations of river channels and lakes are noted, and the various mines—copper, lead, "ancient mines," etc.—are recorded. Other maps by earlier and later publishers were described, and Mr. Sheppard

gave as his reason for noting them that he wished to emphasize the necessity for preserving all old maps and atlases before it is too late, and he recommended that each Society should collect, store and eventually catalogue and describe the maps relating to its own area. He mentioned that the first engraved Map of England and Wales was by Humphry Lloyd, published in 1573, the first County Map was of Yorkshire, by Christopher Saxton, about 1579, and he referred to other Maps by the Cartographers, John Speed, Kip, Holl, and to that of the British Counties, published in Holland, by Blaen and Janson. In 1801 the Government issued their series of Ordnance Maps, since when private enterprise in map surveying has practically stopped. Maps of the 13th and 14th centuries were on vellum, and are principally remarkable for their quaintness, and historically interesting from the place-names and the rough sketches of ecclesiastical buildings, castles, and fortifications delineated.

The first Geological Map was thought of by Dr. Martin Lister, who, in a communication to the Royal Society in 1683-84, suggested maps showing soils and rocks in different colours or otherwise distinguishing them by lines or etchings. His suggestion, however, was not put into practice until 1799, when William Smith produced a Map of 5 Miles around the City of Bath, which was coloured geologically in three colours. That map may now be seen in the Library of the Geological Society at Burlington House. Smith issued his Geological Map of England and Wales in 1815, and it has formed the basis of all subsequent Geological Maps.

At the close of his remarks the President said that, hitherto, it had not been the custom to criticize the Presidential Address, but on the present occasion he invited criticism. A few delegates spoke, suggesting that the address should be printed and circulated among the Societies, and also that ancient monuments, bronze implements, etc., should be duly registered and recorded.

The second meeting of the Conference was held on Friday, 27th August, at 2 p.m.; Mr. Sheppard again presided. Mr. W. Whitaker, F.R.S., opened a discussion on "The Status of Local Societies,—the Means of Developing their Objects, of getting New Members, of Making Announcements and of Publishing Papers."

This was a very wide subject and there were many speakers in addition to Mr. Whitaker; the consensus of opinion may be briefly summarized. It was suggested that the work done by the various Societies should be made widely known in their respective districts, that reports of their meetings, etc., should be sent to the local press, and that everything relating to the district should be recorded. Mr. Whitaker laid great stress on the recording of small facts, and deprecated burdening the local Societies with the cost of printing other matter than that relating to their area. Professor Turner and Professor J. L. Myers, joint secretaries of the Association, spoke of the valuable work done by the Corresponding Societies, and the latter suggested the advisability of keeping in touch with nature study scholars after they left their class studies. Several delegates referred to the increased cost of meetings and of publishing their transactions. The Chairman suggested curtailing the reports of proceedings. He mentioned that he had seen a printed report in the Journal of a certain Society where 48 pages were taken up in recording the proceedings of their annual dinner!

Several delegates suggested the more frequent change of office-bearers and Committee, and two or three even went so far as to suggest that this should apply also to the Local Secretaries. Mr. Whitaker, in closing the debate, agreed that it was advisable to have a change in the office-bearers and Committee, but as to the Secretary, he said, "You should be very careful in selecting your Secretary, and when you have got him, keep him as long as you can."

He submitted the following motion:—"That this Conference recommends the Council to call a meeting of the delegates and office-bearers of the respective Corresponding Societies, to be held in London at a convenient date, when this subject may be further discussed." The motion was agreed to by a majority.

ESSEX MUSEUM LIBRARY DESIDERATA.

Inserted loosely with this Part will be found a list of Parts of Transactions of Societies and other publications, required to complete the Club's Library sets. Members who may happen to possess any such Parts which they can spare, are cordially invited to forward them to either the Hon. Librarian or the Hon. Secretary at the Essex Museum, Stratford, where they will be gratefully received and acknowledged.

PUBLICATIONS of the ESSEX FIELD CLUB.

The specially-valuable feature of the Publications of the Club is that they are almost wholly local in character. The volumes (comprising over 6,000 pages) contain hundreds of papers on the Natural History, Geology, and Pre-historic Archæology of Essex. The articles are of the greatest interest to all persons having any regard for the County, and the scientific accuracy and detail of a large proportion of them make them of value also to students of the subjects named living elsewhere.

The publications are all of demy octavo size. Nearly all contain numerous illustrations, in addition to plates. All are still in print, but some are becoming *very rare*.

“TRANSACTIONS” and “PROCEEDINGS” (in parts).

This series, which ran from 1881 to 1886, is no longer published, having been superseded by the *Essex Naturalist* (see below).

Volume.	Date.	Pages.	Plates.	Price.	Complete Set.
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Volume I	1881	lxxv + 110	— *	By special arrange- ment.
“ II	1882	xcī + xxx + 196	6 *	
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“ IV (<i>Trans.</i>)	1886	vii + 228	1	0 8 0	
“ IV (<i>Proc.</i>)	1892	ccxix + vii + lx	—	0 9 6	

* Volumes I and II of the “Transactions” can be supplied *only with complete sets*, of which but few are in hand.

“THE ESSEX NATURALIST” (in parts).

This publication (of which the eighteenth volume is now completed) has been since 1887 the official organ of the Club. In it are published all the scientific papers read before meetings of the Club, reports of meetings, contributed notes, &c.

Volume.	Date.	Pages.	Plates.	Price.	Complete Set
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Volume I	1887	viii + 280	5	By special arrange- ment only.
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“ IV	1890	viii + 264	—	
“ V	1891	viii + 264	5	
“ VI	1892	viii + 208	1	
“ VII	1893	viii + 200	1	
“ VIII	1894	viii + 248	—	
“ IX	1895-6	xii + 264	1	
“ X	1897-8	xii + 416	2	
“ XI	1899-1900	xi + 370	9	0 14 0	
“ XII	1901-2	xii + 288	9	0 10 6	
“ XIII	1903-4	xii + 268	13	0 15 0	
“ XIV	1905-7	xii + 280	32	0 15 0	
“ XV	1908-10	x + 288	5	0 15 0	
“ XVI	1910-12	xii + 332	19	0 15 0	
“ XVII	1912-14	x + 292	19	0 15 0	
“ XVIII	1915-18	viii + 321	9	0 15 0	
“ XIX	1919	<i>In progress</i>	—	

Volumes I to X, now rare, are supplied on special application only, at the discretion of, and at prices fixed by, the Council of the Club.

For continuation see over.

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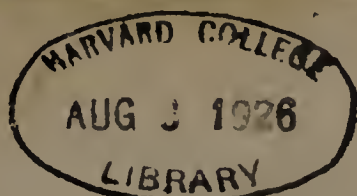
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EDITED BY PERCY THOMPSON, F.L.S., *Honorary Secretary*
assisted by
HENRY WHITEHEAD, B.Sc

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TEN YEARS' PROGRESS IN LICHENOLOGY IN THE BRITISH ISLES.

(Being a Presidential Address delivered to the Club at the Annual Meeting on 2nd April, 1921.

By ROBERT PAULSON, F.L.S., F.R.M.S.

(With Four Plates.)

DURING the past year the Club was able to avail itself of a favourable opportunity for acquiring, by purchase, some 590 specimens that formed part of the lichen-herbarium of the late Rev. W. Johnson, a well-known collector and keen observer of cryptogamic plants. As a result of this purchase it now possesses nine fasciculi of Larbalestier's *Lichen-Herbarium*, two fasciculi of his *Lichenes Rarissimi*, and 150 British lichens collected by the Rev. W. A. Leighton, who did much pioneer work, culminating in the publication of a Lichen Flora of Great Britain, which became, and still is, indispensable to all students of British lichens. Larbalestier, a most enthusiastic lichenologist, spent much time in collecting lichens in the Channel Islands and in West Ireland; the accuracy of his keen discriminating power is evident by reason of the number of lichens he was able to add to the British flora.

So recently as February last the Club received a valuable grant of duplicate lichen-specimens from the Trustees of the British Museum, through the kind offices of Dr. A. Barton Rendle, Keeper of the Department of Botany. This gift is of the greatest value to the Club, for the specimens form a set of the lichens of Epping Forest collected and named by the late Rev. J. M. Crombie, who, until his death, was intimately connected with the Club as an honorary member.

The acquisition of the above has augmented the number of lichen-specimens in the Club's herbarium by 1,192, the total number of which is now 1,500, including a few duplicates. This large addition to the herbarium deserves more than a passing note, and for this reason I have made it the occasion for placing before the Club a short resumé of the progress of lichenology during the decade 1911-1920.

It is not possible within the space of an hour to give more than a brief outline of the salient points, although, owing to

the check given to work of this nature during the period of the War, the number of papers published was considerably below the normal.

The advance of botanical knowledge along ecological lines makes it more and more evident that greater attention than has hitherto been given should be paid to the cryptogamic flora of districts that are suitable for thorough botanical survey.

A means by which the Club can foster progress is that of providing a well-arranged and fairly complete herbarium of cryptogams, by the aid of which botanical members can obtain a fuller knowledge of these plants, and a greater facility for naming specimens gathered in the field.

The direction along which lichenology has progressed during the past ten years can be ascertained with some degree of accuracy from a summary, arranged under suitable headings, of papers that have contributed to our knowledge of lichens during the period 1911-1920. Such a record (appended to this paper) makes it quite possible to follow the trend of recent research by British lichenologists.

In addition to papers dealing directly with lichens, articles covering a wider range, but at the same time contributing new matter concerning these organisms, are included in the list.

Papers may be conveniently grouped according to their subject matter under the four heads¹: Records, Ecology, Morphology and Physiology, Symbiosis. The percentages of the numbers placed under each heading are approximately:—Records 45%, Ecology 39%, Morphology 3%, Symbiosis 13%.

In compiling such a bibliographical summary it has been found necessary occasionally to include a paper under two distinct headings, viz., when it consists for the most part of lists of recorded species, and at the same time includes, interspersed between the lists, important ecological notes.

It is not suggested that this summary approaches the point of exhaustion, but at the same time it is not probable that later additions to it, of papers that may be inadvertently omitted on this occasion, will materially modify the results already obtained.

Papers under the heading "RECORDS," are not referred to further than to say that they include lists of lichens,

1. The numbers in brackets refer to the serial number of the article in the appended Bibliography.

more or less complete, from a large number of localities in the British Isles, extending from the Shetlands to Essex and Devonshire, and from Suffolk to County Mayo in Ireland.

There has been a marked increase in the number of ECOLOGICAL PAPERS published. The causes for this increase are not far to seek for they are mainly due to the publication in this country of two books:—Types of British Vegetation (30), and A Monograph of British Lichens (31). The former, described in the dedication as “This first attempt at a scientific description of British Vegetation,” and in the preface as “An endeavour to present a scientific classification and a balanced picture of British vegetation, as it exists to-day,” gave to investigators a definite plan by which work could be systematized; the latter became, at once, the standard of reference for nomenclature and classification, and placed that branch of lichenology on a high level among Continental works of a similar kind. Part I of the “Monograph,” originally compiled by the Rev. J. M. Crombie, was rearranged and almost entirely re-written by A. Lorrain Smith (31).

It has not been found practicable to refer to investigations in strictly chronological order, for it is sometimes advisable to associate papers that are similar as regards the subject under investigation without respect to date; but the order of sequence has been followed for the most part.

The ecological papers treat of a wide diversity of habitat, including rocky sea coasts, inland localities, mountain heights and lowlands. They embrace the rocky coasts of west Ireland, of Howth Head, and of the Isle of Arran; the low-lying sand and shingle of Blakeney Point, Norfolk; the sand-dunes of Lancashire, the Isle of Man, Devonshire and Somersetshire. They recall the fresh invigorating sea breeze, the salt splash of the waves of the incoming tide, the pure atmosphere and the intense light of the mountain summit.

The lichens in various localities around the coast of the British Isles have been, during the period under review, investigated ecologically, and important additions have been made to our knowledge of maritime and marine formations and associations.

It is to be regretted that the methods of recording results have not been uniform. It is worth consideration whether

it would not be advisable to discard altogether the custom of grouping lichens as corticolous, saxicolous, and terricolous, when dealing with them ecologically. The terms lack precision. A very common lichen of the rocky sea coast, *Ramalina siliquosa*, is not there solely because of the chemical nature of the rock on which it grows, but because the rock is in close proximity to the sea.

Some lichens require to be immersed in sea water for a lengthened period during each tide; others take up a position within reach of spring-tides only, while a group growing above the level of the spring-tide needs the salt spray of the breaking waves, and still another group, although growing in proximity to the sea, is so situated that the plants are beyond the too frequent reach of salt water, as is the case with the *Ramalina* just referred to.

Lichens that grow within the tidal flow give to the rocks a black mantle, consisting mostly of *Verrucaria maura* and *V. mucosa*. In a report (1911) by the Committee of the Clare Island Survey, A. Lorrain Smith writes "The rocks bordering the sea and the great cliffs of the north-west shore of the Island are black with an unbroken growth of *V. maura*." In another part of the same report (1912), devoted to Algae, A. D. Cotton gives a description of a plant association which he names the *Hildenbrandtia-Verrucaria* association, after the dominant seaweed and lichen, which, though similar in growth form, differ in colour, the seaweed being dark reddish-brown, whilst the lichen is almost black (27).

Although Cotton reported on Algae he found it necessary to include (in addition to the *Verrucaria*) two other lichens, *Lichina pygmæa* and *L. confinis*, in his tabulated lists of algal associations and other communities composing the rocky-shore formation in the Clare Island area. The first of these occurs between the tide marks, but the second is always above high-tide level. There is a distinct zonation in the distribution of these plants. "The respective zones sometimes approach each other closely, but never overlap." He remarks that in the absence of *Fucus*, *Lichina pygmæa* forms a useful means of determining tide levels.

Lilian Lyle (29) notes that *Lichina pygmæa* on rocks and boulders also forms whole nurseries for sporelings of *Fucus*,

etc. Her observations do not always coincide exactly with those of Cotton and Knowles, especially as stated in the paragraphs describing the *Lichina* zone.

A detailed description of lichens as they occur on a steep rocky coast was published in a paper by M. C. Knowles (4b). Before the publication of the results of her investigations, in 1913, very little detailed work on this aspect of lichen growth had been attempted anywhere. The author vividly describes the general appearance of lichen belts in these words "As one walks along the tops of the headlands when the tide is low, a dark band, which seems like a stain on the rock-surface, can be distinctly traced upon the cliff faces and on the rocks of the sea shore. At high spring-tide the band is almost hidden by the water, but it becomes wider as the tide falls; and at low spring tide it seems to end, on the cliffs and high rocks, in a well-defined line running parallel to the surface of the sea at a few feet below the level of ordinary high tide, contrasting in a striking manner with the paler band of the barnacle-covered rocks below it."

Three almost unbroken colour belts occur on the Howth coast. They are described as the black, the orange, and the light grey-green belts. The black belt is further divided into two zones, the lower being the zone of marine lichens, first described by M. C. Knowles; it consists of *Verrucaria microspora*, *V. striatula* and *V. mucosa*. The upper is the *Verrucaria maura* zone, which is bordered by a fringe of *Lichina pygmæa* below and by *L. confinis* above.

The orange belt is formed mostly of bright orange-coloured lichens as *Xanthoria parietina*, *Placodium murorum*, and *P. decipiens*, var. *lobulatum*.

Above the orange is a wide grey-green belt of *Ramalina siliquosa*, a lichen which is abundant on rocky coasts, especially in the west of England, its mass of colour being a striking feature of several localities.

Both the Clare Island Report and the paper on Howth Head direct attention to the differences between the lichen growth on silicious and on calcareous rocks. Such differences are often plainly evident, but from this fact it cannot be inferred that the composition of the rock is always the main factor in determining the presence of the lichen upon them. In "Lichens of Arran" (5a) the reader is reminded that certain

lichens, e.g. *Verrucaria nigrescens*, *V. maculiformis*, *Placodium tegularis* and *P. lobulatum*, which in many parts of the country are restricted to calcareous rocks, were observed on silicious rocks on the Arran coast. From this the authors conclude that these exposed spray-washed maritime rocks afford the requisite xerophytic conditions which in other districts are only furnished by limestone, and that the chemical composition of the substratum does not come into question in these cases.

It has elsewhere been demonstrated, "Lichens of Epping Forest" (18), that substratum is not always the main determining factor in the appearance of particular species. They do not always grow upon the bark of the oak (for instance) mainly because it is oak, for the oaks in a *Quercus pedunculata* wood on London clay and those of a *Quercus sessiliflora* wood on a better-drained lighter soil, at a short distance from the former, exhibit a marked contrast relative to the percentage of trunk covered by lichens, and also in the number and luxuriance of the species of the latter. Edaphic conditions of the soil appear to exercise considerable influence, favourable or unfavourable, on the lichen growth on oak trunks of such woods.

S. West published a series of observations in 1914 on the cryptogamic flora of tree trunks growing in exposed mountainous situations in the British Isles. He found that the moss *Stereodon cupressiformis* var. *filiformis* was by far the most abundant epiphyte, and that the lichen *Parmelia saxatilis* came next. In the general summary of his observations he does not compare trunk with trunk, i.e. oak with ash, or ash with beech, but gives results as to percentage of surface of trunk covered.

On a low-lying sea-coast, bordered by shingle banks and sand-dunes, powerful factors inimical to lichen development are frequently active; they are (1) the mobility of the sand, which effectively prevents any form of vegetation from establishing itself; and (2) the scouring force of the sand blast. Vegetation cannot withstand the constant attrition caused by blown sand. Surfaces of pebbles exposed to it are rapidly denuded of all substances that have accumulated upon them during a period when the sand blast was not active.

There is a marked difference between the surfaces of pebbles exposed to the sand blast and those that are more or less sheltered. The former are bare, while the latter have crustose forms of

lichens upon them. *Rhizocarpon confervoides* is frequently the most abundant lichen on pebbles by the sea-shore.

Among the more stable sand-dunes, and in situations between the parallel sand-ridges, there is often an abundant lichen-flora as can be well seen at Studland, south of Poole Harbour. Although growth may be luxuriant, the number of species is small, the dominant species being often *Cetraria aculeata* var. *acanthella*, or some species of *Cladonia*. The *Cetraria* is well adapted to growth in a sand-dune area, for it is more luxuriant and more frequently fertile in such a situation than on the sand and gravel of the upland heath.

R. C. McLean (15) recognizes two plant formations, (1) the Dune, and (2) the Shingle. From these arise five associations, three belonging to the Dune formation as Bare Sand, Grey Dune and Derelict Dune, and two to the Shingle formation, distinguished as High Shingle and Low Shingle. The Shingle is not that on the seaward side of the main bank, which for very obvious reasons is totally bare, but shingle on the landward side, which forms promontories projecting into the sea-marshes, and is washed only occasionally by the waves of a high-tide.

McLean's investigation of lichens among shingle throws additional light upon the comparatively rapid growth of certain species, a feature that had been described in "Lichens of Epping Forest" (2). He concludes that the growth of certain lichens is more rapid than has been generally assumed to be the case, the reasons for such conclusion being fully explained in the paper referred to.

In "Lichens of S. Lancashire" (5b), the authors express the opinion that lichens among sand-dunes are largely dependent on higher plants for the creation of edaphic conditions requisite for their development and existence. As a rule, however, on rock surfaces lichens are the pioneers, and are followed by mosses, grasses, etc.

Breckland, or the Breck country, a district covering an area of about 400 square miles, is situated partly in south-west Norfolk and partly in north-west Suffolk. It comprises for the most part a series of sandy heaths and commons of low elevation. The ecology of the vegetation of this area is described by E. Pickworth Farrow (17). His attention had been drawn to certain areas, varying in size, that were quite bare of vegetation, but

loose portions of turf lay scattered over the surface. An explanation for this peculiar condition could not be satisfactorily suggested until a comparatively bare area was discovered which included large numbers of detached patches of vegetation that were similar in form and structure, being convex above, undercut at the edges, and standing higher than the general level of the bare sand around them. All stages in the formation of these patches, from the commencement to the fully-formed "cupola-like" mass standing upon a slender central pillar exhibiting root fibres below, were present. There was evidence that they had been formed by sand blasts, aided in the first stages by rabbits that had partly destroyed the vegetation.

This part of Farrow's paper is particularly interesting to the lichenologist from the fact that it notes a retrogression of vegetation back to the early lichen stage.

Commencing with a cupola during the early stages of its formation, he found the heath grasses *Agrostis vulgaris* and *Festuca ovina* co-dominant, then, following this stage, *Festuca* became the sole dominant. This state was followed by the moss stage with *Campylopus flexuosus* and *Ceratodon purpureus* co-dominant on the central portion of the upper surface. Last of all came the lichen stage with *Cladonia coccifera*, *C. cervicornis*, *Cetraria aculeata*, and *Lecidea uliginosa*.

Very little had been written about the lichens of the arctic-alpine vegetation previous to the description of the alpine vegetation of the mountain Ben-y-Gloe (12). The authors supply many examples of the adaptation to the severe climate that such plants endure. Attention is drawn to the stony nature of the ground, the rapid drainage after heavy rain, and the absence of soil except in the deep interstices between the stones. After rainfall there are often intervals of bright sunshine which cause rapid evaporation from the rock surface so that vegetation depends to a great extent upon the prevalent cloud-mist, and for this reason there are special adaptations for securing water supply, thus, *Cerania vermicularis*, which is mostly prostrate and resembles small white worms upon the ground, turns up its pointed ends as an attraction to the dew. Many lichens, like the stunted phanerogams in similar situations, are compact and cushion-like. The only foliaceous *Parmelia* seen was *P. alpicola*, so reduced that it resembled a crustose *Lecanora*.

The authors sum up the conditions under which the lichens exist in the following paragraph.

“Like the scouts of an army these outposts of vegetable life lead a precarious existence and they ‘take cover’ behind any prominent object, especially on the leeward side. The attitude of many of the species may be described as one of ‘crouching’ to obtain shelter from the wind.”

O. V. Darbishire (14) wrote on the lichen thallus as adapted to the nature of the substratum on which it is found. Many crustaceous forms growing on the bare surface of a rock, as *Rhizocarpon confervoides* and *R. geographicum*, have, rising from the hypothallus, which firmly adheres to the rock, a number of many-sided irregular columnar areas separated from one another by numerous microscopic clefts. The outer surface of an area is covered completely by a regular fungal cortex, but this does not continue down the sides of the clefts, where the gonidia are almost at the surface. During a period of dry weather the clefts widen, but immediately on the fall of rain the water is drawn in between them; the thallus swells up and the openings are closed, so that the upper surface becomes practically entire and evaporation is for the most part suspended.

As an example of lichens that grow within minute cavities of rocks *Verrucaria calciseda* is taken as a type. This lichen eats its way into calcareous rocks, forming minute pits in which *perithecia* are developed. There are several *Verrucarias* and allied species of a similar habit.

Corticolous lichens are grouped in a corresponding way, viz. those growing on the exterior of the bark, and those appearing under or within the bark.

An interesting feature of this paper is the series of excellent photographs by which it is illustrated.

Papers treating of the MORPHOLOGY AND PHYSIOLOGY of lichens must be considered with those treating of the question of SYMBIOSIS. These have been few in number. Paulson and Hastings (23) discuss the relation between the alga and fungus in the lichen thallus in cases where the alga belongs to the *Chlorophyceæ*, and conclude that penetration of the algal cell by the fungal hypha occurs very seldom, if ever. Any theory of parasitism, or helotism, based upon the fact of penetration, has very little indeed to support it. The authors note (1) that

as a rule, only a few dead algal cells were seen in the material used for investigation, (2) that large numbers of algal cells are always unattached to hyphæ, (3) that the algal cells do not divide vegetatively as is so generally assumed, and (4) that sporulation frequently takes place within the thallus in the same manner as in cells that have been isolated from the thallus and subjected to cultural methods. These points are well illustrated in the reproductions of photo-micrographs which illustrate the present paper. (Plate XXIII. figs. 1 and 2, Plate XXIV. fig. 3.)

Several stages in the process of sporulation of the gonidia (algal cells) of *Evernia prunastri* are shown by photo-micrographs which illustrate a paper by the present writer (26) on the sporulation of the algal cells within the lichen thallus. Each fully developed gonidium is potentially a mother-cell, and, as the wall of each mother-cell becomes diffuent, during the liberation of the daughter-gonidia, the absence of a large number of empty cell-walls is accounted for. The presence of empty cell-walls of gonidia within the lichen thallus has been advanced as an argument in support of parasitism on the part of the fungus symbiont.

An important paper by Dr. A. H. Church, entitled "Lichen Symbiosis" (24) has been recently published. In this the author, by the use of a quotation from the "Text Book of Botany," Strasburger, English edition, 1912, p. 417, directs attention to the generally accepted meaning of the term symbiosis. He maintains that the word, borrowed from zoological usage, is a perfectly meaningless expression from the fact that any meaning it is intended to convey has been lost in the vagueness with which it has been applied. If "mutual advantage" is to be understood it can be more clearly expressed as *mutual dependence*.

The statement, that in the case of the alga of a lichen, reproductive organization is wholly wanting or omitted, does not fully agree with recent evidence, gathered from published photo-micrographs of the sporulating gonidia of *Evernia prunastri*, referred to above (26). These clearly demonstrate that sporulation of the gonidial cells (*Chlorella*) within the lichen thallus is of common occurrence. It is more frequent within the thallus than it is in free *Chlorella*, where sporulation has been described as taking place only very rarely.

The author describes various growth forms of the lichen thallus as exhibited in *Peltigera canina*, *Physcia parietina*, foliose forms, *Usnea barbata*, and *Cladonia sylvatica*, fruticose forms, and claims that such raise doubts as to whether the fact of the association of fungus and alga has anything to do with the matter of form; and adds further, "that such doubts are confirmed when one realizes that not one of the form factors is anything new after all, as they are in fact only a repetition of the commonest common-place factors of the somatic organization of algæ as seen in modern sea-weeds." From this it is inferred that the fungus symbiont, after association with the alga, continues to develop a growth form similar to that exhibited by its ancient ancestry which, as Dr. Church asserts, was evolved in the sea. "It is to the sea that one must look for the analogue of any specialised lichen-thallus."

A subsequent paper, "The Lichen as a Transmigrant," by the same author (25), although not published within the period now under review, has been included, owing to its intimate association with the one entitled "Lichen Symbiosis."

The reader is reminded that in an ordinary Fucoid the photosynthetic chlorophyll cells are in close contact with the external food solution, for they constitute a thin brown external film surrounding the mechanical tissue of the central axis. "Stripped of the outer layers, the whole plant reduces to a system of hyphal strands as an interwoven mechanical tissue of descending hyphæ, to all intents and purposes the mycelium of a fungus-axis." The more internal tissues having previously lived at the expense of the surface layers and not feeling the effect of the change of environment so readily would continue to live for a time.

"A higher fungus of the land is in short a skinned sea-weed . . . of which, on the death and decay of the older metabolic and autotrophic surface layers the exposed internal tissues continue their existence at the expense of the soluble carbohydrates of the standing and non-aerated medium."

The writer's view is that "the main series of higher Eumycetes are derived from stripped sea-weeds, which emerge from the water. . . . The Lichen represents the case of similar simple or branched algal somata, remaining denuded of autotrophic tissue in standing pools, and, hence, soon smothered

with a growth of green autotrophic flagellates, now ready to take advantage of the penetrable tissues of the enfeebled hosts in their demand for a benthic substratum." The green flagellates supply the place of the original green film of the surface layers, and thus the tissues of the denuded central axis are able to continue their metabolism at the expense of the waste carbohydrate and liberated oxygen that is available in the vicinity of the newly acquired green autotrophic cells.

It is evident from what has already been said, that the greater number of papers on lichen ecology consists of those relating to the sea-coast. It is possible that this is so because such localities are more accessible than high mountain summits, which need to be visited frequently if effective work is to be accomplished, for the greater part of the observation can only be carried out while the lichens are *in situ*.

Contributions to our knowledge of the ecology of the lichens of lowland woods have not been forthcoming to any great extent.

It would appear that an increasing number of botanists are being attracted to the subject of lichens; but the scarcity of reliable guides, both for field work and for the laboratory, has militated against the pursuit of lichenology in this country. We can, however, now look forward, to meet this want, to the two volumes that are announced as in the press, both of them by Miss A. Lorrain Smith, one being a volume of the "Cambridge Botanical Handbooks" and the other a book for field work, somewhat similar in size and volume to "Hayward's Botanist's Pocket Book." It may here be noted that photo-micrography has been recently employed, for the first time in this country, for illustrating papers dealing with lichen symbiosis and lichen spores.

I take this opportunity of thanking Professor F. W. Oliver for lending me lantern slides and specimens for exhibition, and Mr. J. H. Pledge for the very valuable help he has given me in making photo-micrographs, from my preparations.

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The titles of papers are arranged in sections according to the chief feature of the contents, and also in chronological order, except when more than one paper by the same writer has to be

noted in a definite section. A paper, as explained previously, occasionally appears in more than one section.

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DESCRIPTION OF THE PLATES.

PLATE XXIII. Fig. 1. Trans. sect. of a squamule of the thallus of *Cladonia digitata* Hoffm. (a) upper cortical layer ; (b) gonidial layer ; (c) medullary layer. The gonidia occur in spherical groups. $\times 240$.

*These have been published since the foregoing address was delivered.

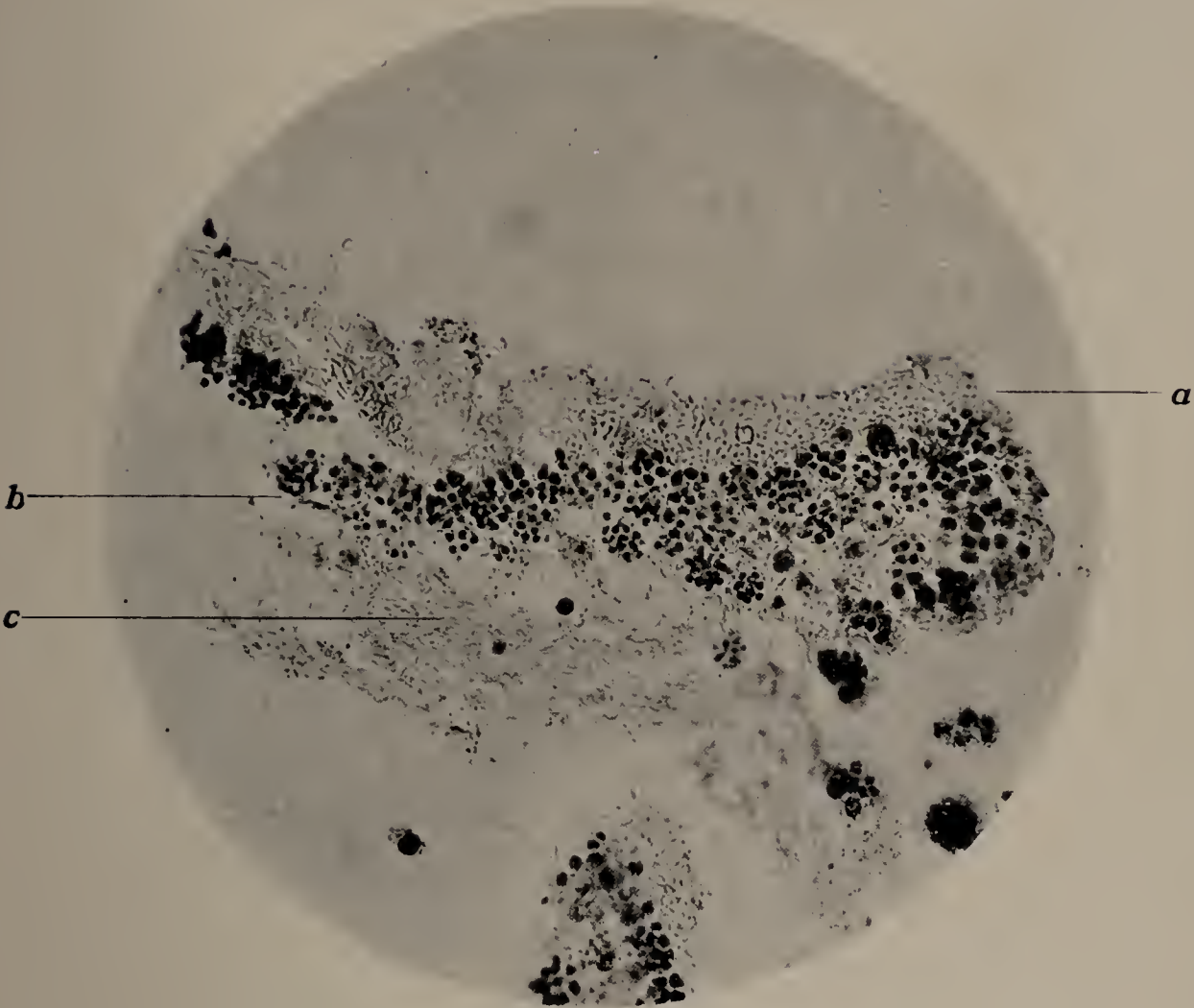


FIG. 1.

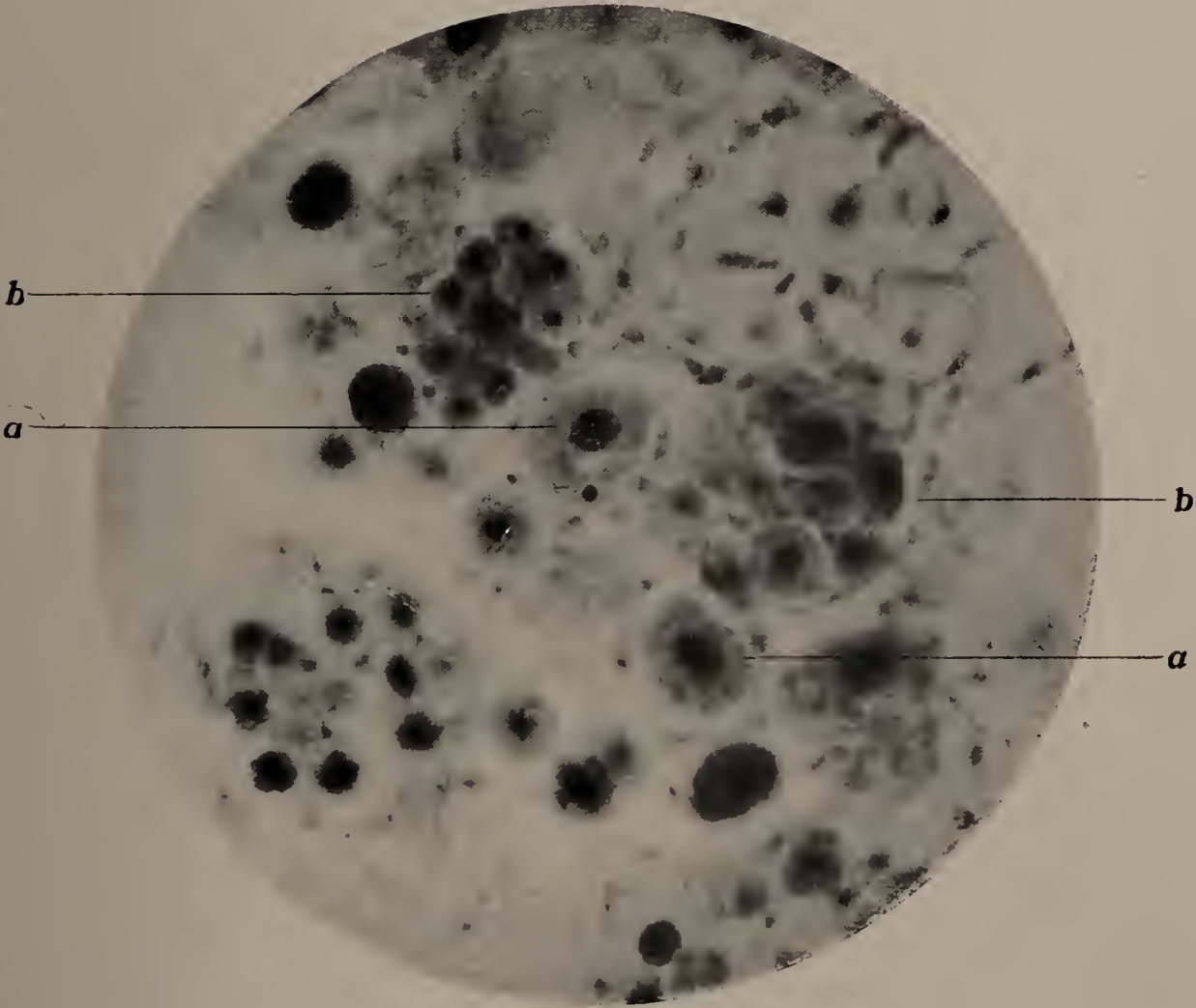


FIG. 2.

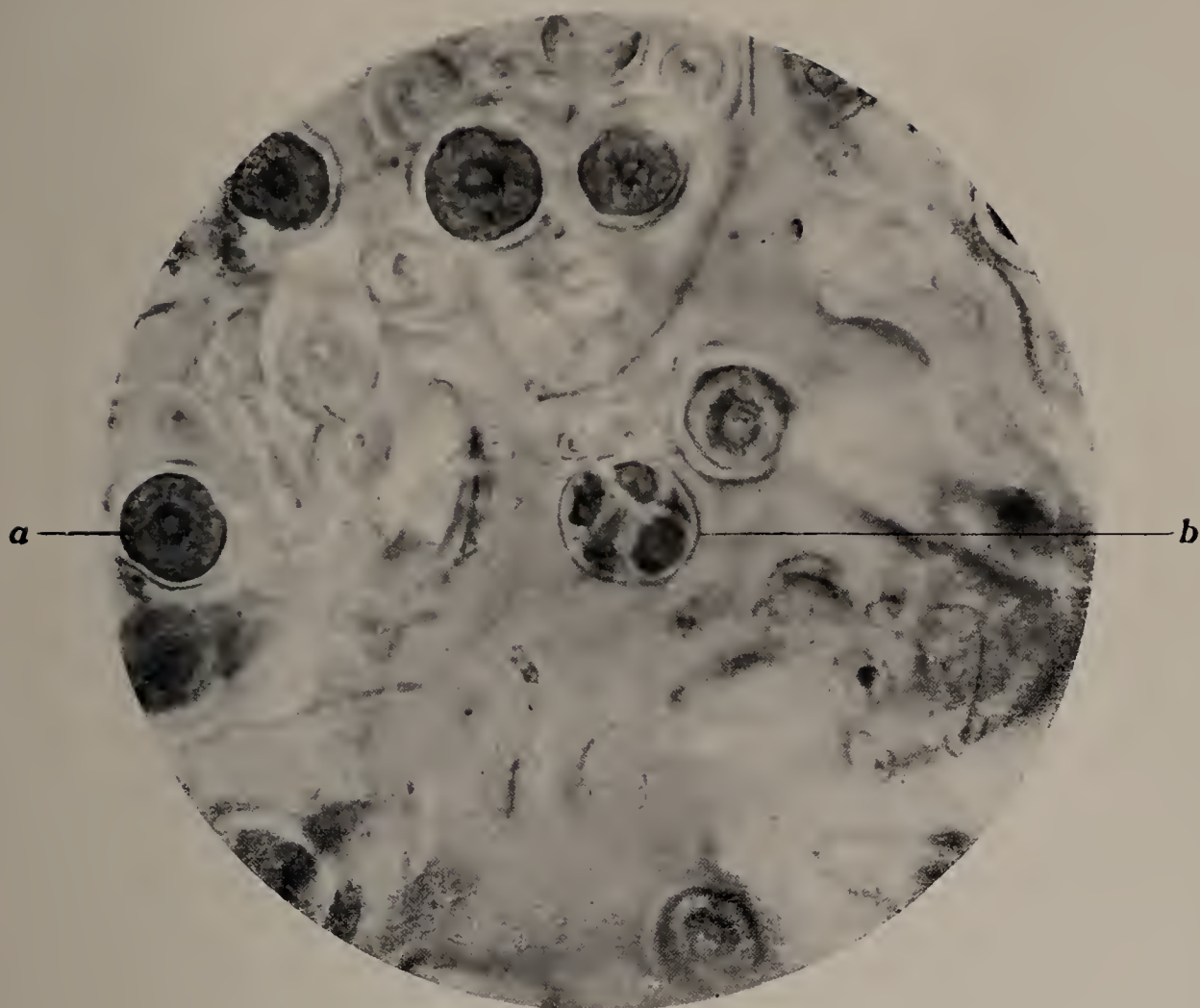


FIG. 3.

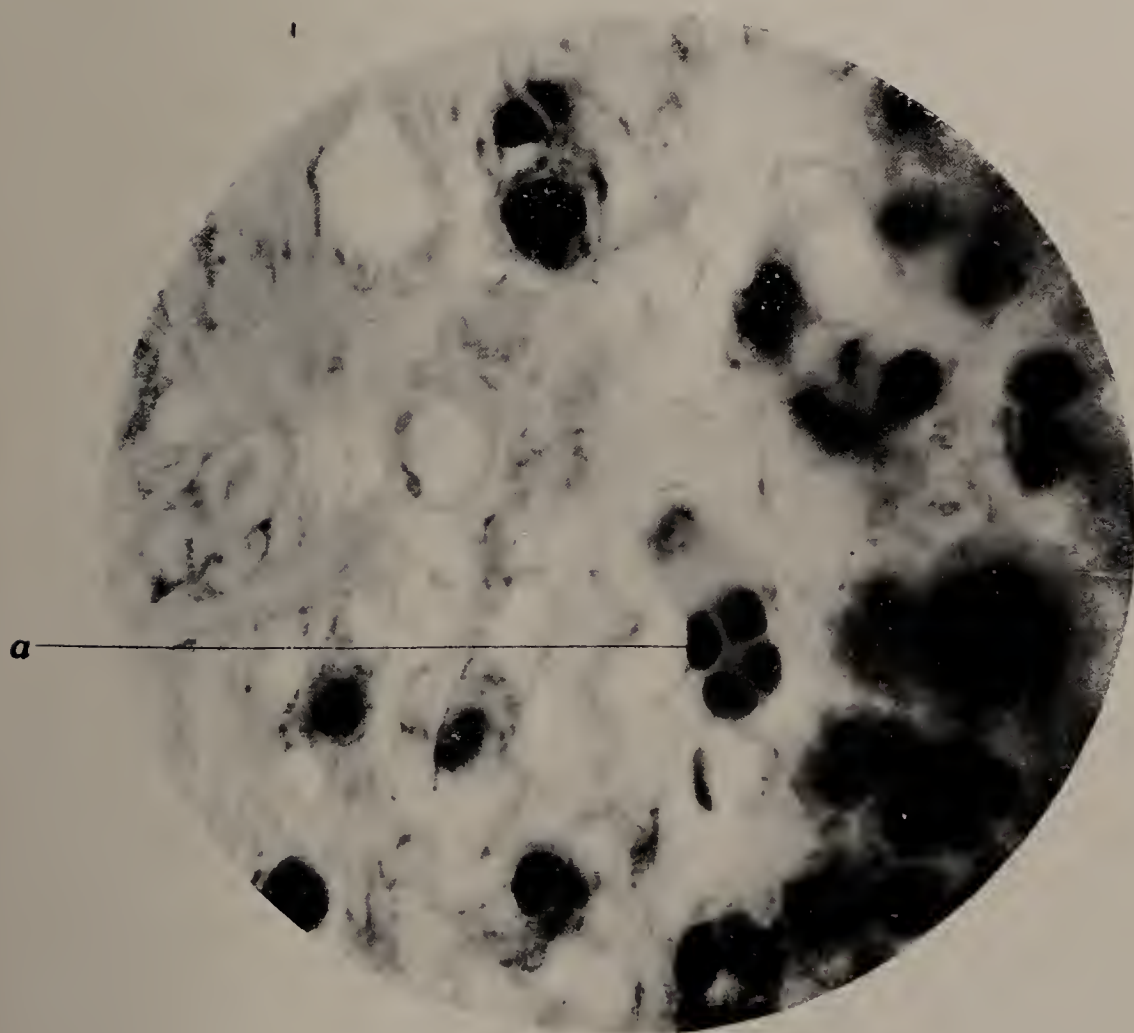


FIG. 4.



FIG. 5.



FIG. 6.

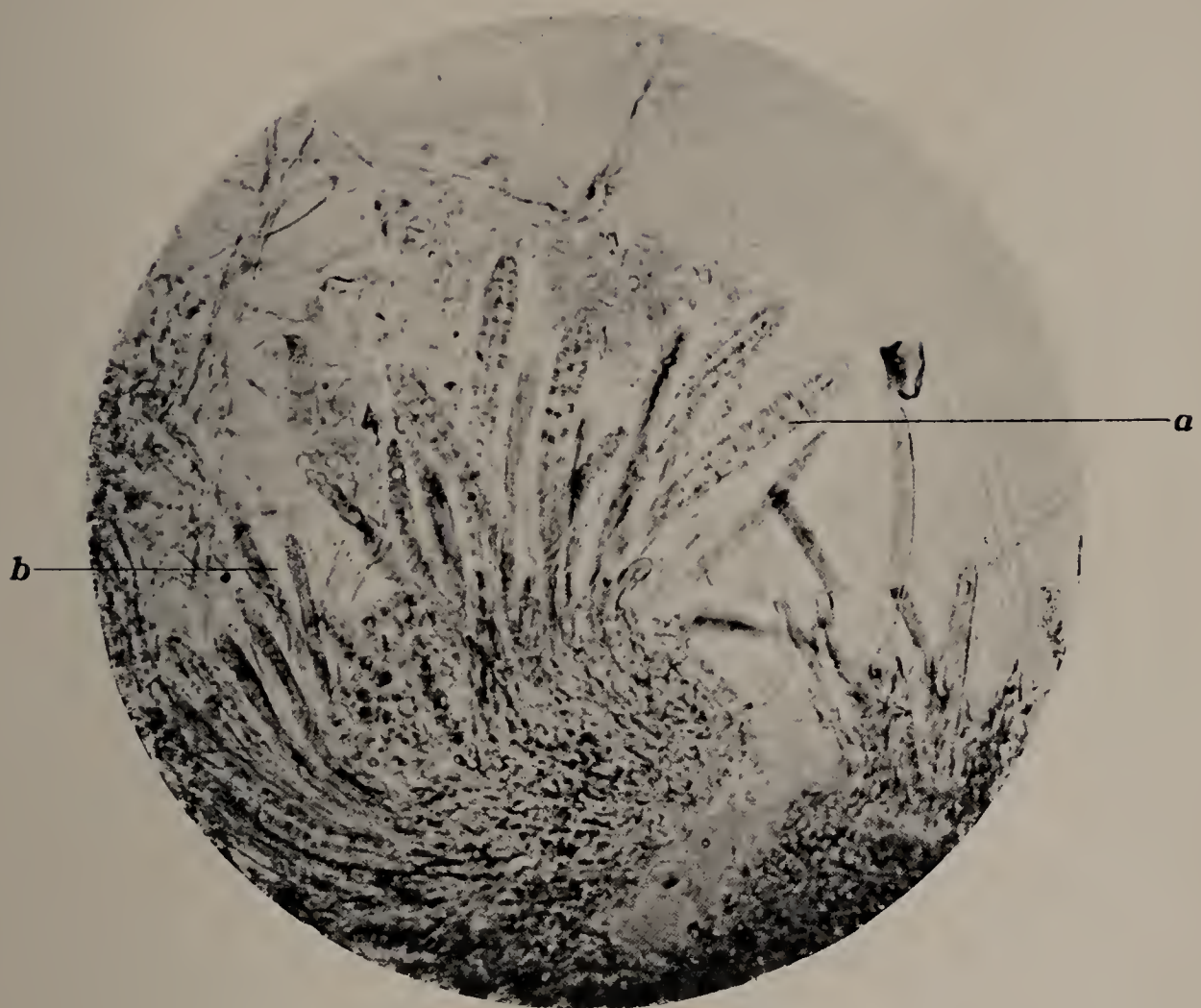


FIG. 7.

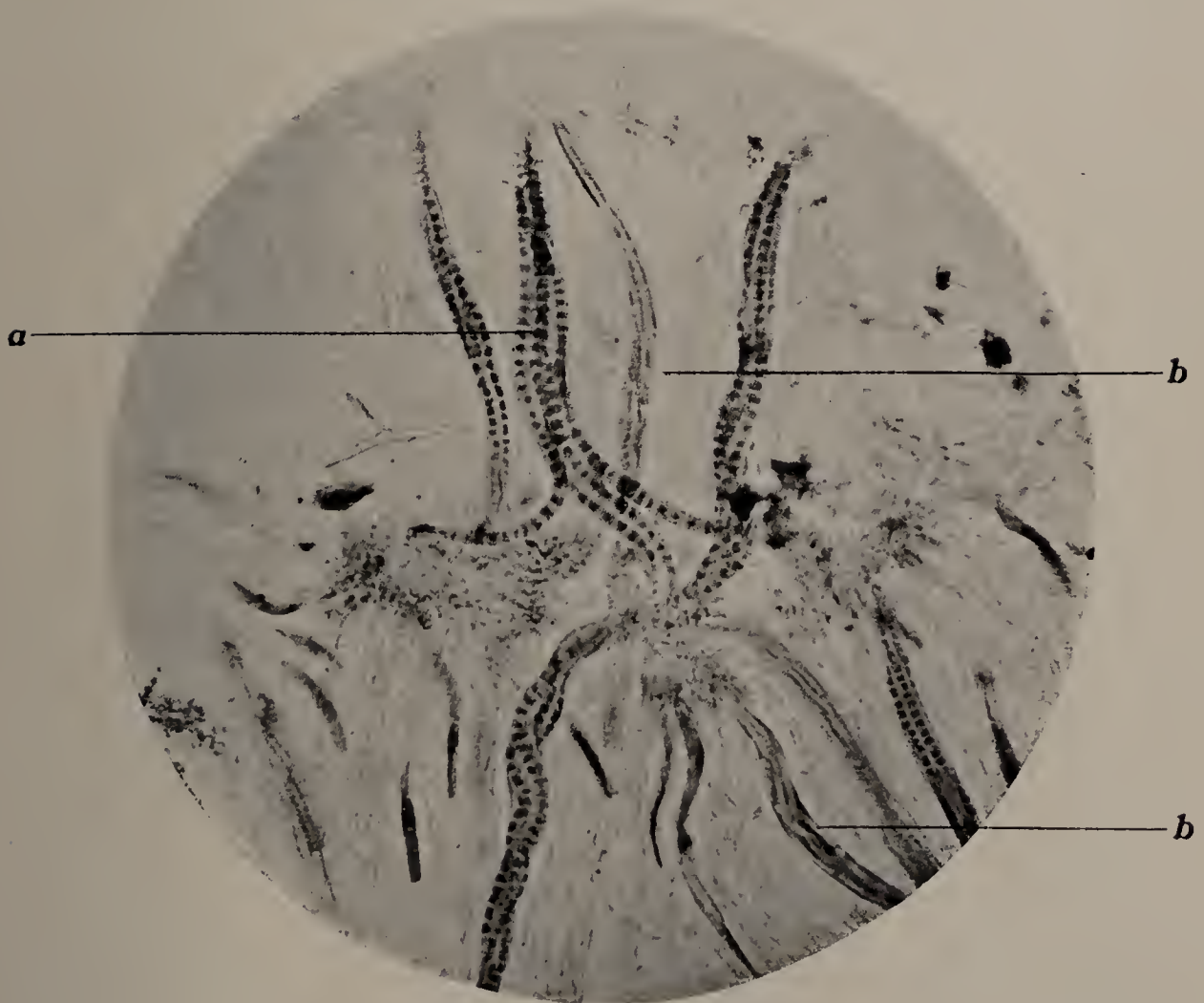


FIG. 8.

- PLATE XXIII. Fig. 2. Gonidial layer of the above ; (a) fully developed gonidium (*Chlorella* cell), showing central nucleus and a small excentric body surrounded by a light area ; (b) group of daughter gonidia just after liberation from a mother cell. $\times 1000$.
- PLATE XXIV. Fig. 3. Gonidial layer of the thallus of *Evernia prunastri* Ach. ; (a) normal gonidium ; (b) sporulating gonidium. $\times 1000$.
- PLATE XXIV. Fig. 4. Gonidial layer of *Dermatocarpon aquaticum* A. Zahlbr, showing ; (a) vegetative division of a gonidium (*Protococcus* cell). $\times 1000$.
- PLATE XXV. Fig. 5. Asci, each with eight uni-septate ascospores, from the perithecium of *Acrocordia Salweii*, A.L.Sm. ; (a) fertile ascus ; (b) immature ascus. $\times 250$.
- PLATE XXV. Fig. 6. Ascus with eight ten-septate spores from the apothecium of *Graphis elegans* Ach. $\times 250$.
- PLATE XXVI. Fig. 7. Asci, each with eight multi-septate acicular spores, from perithecium of *Gongylia viridis* A.L.Sm. ; (a) fertile ascus ; (b) immature ascus. $\times 250$.
- PLATE XXVI. Fig. 8. Asci, each with four thirty—to forty—septate spores, from apothecium of *Conotrema urceolata* Tuck ; (a) and (b) as above. $\times 250$.

SAMUEL HARSNETT, ARCHBISHOP OF YORK.

By GEORGE RICKWORD, F.R.Hist.S.

[Read at Colchester, March 27th, 1921.]

DURING the sixteenth century several Colchester men achieved distinction in the service of the Commonwealth. Thomas Audley, a yeoman's son, rose from the office of Town Clerk of Colchester to that of Lord Chancellor of England and a Knight of the Garter ; John Lucas, another lawyer, founded, from monastic spoils, a family which in the next generation ranked with the first houses in the land ; and William Gilberd, the son of yet a third lawyer, became physician to two sovereigns and gained undying fame by his scientific discoveries as the Father of Electrical Science.

A Colchester lad, Samuel Harsnett by name, rose from yet humbler beginnings, by sheer force of merit, to the position of the third person in the kingdom outside the blood royal. He was born on, or just before, June 20th, 1560, when he was

baptized in the parish church of St. Botolph, Colchester, only a few years earlier the church of a priory of Augustinian Canons. His father who, according to tradition, lived at the small house at the corner of Priory and St. Botolph streets, was one William Harsnett, a baker, a trade still carried on there.

The Harsnett or Halsnoth family had migrated some half century before from Kent, and numbered among its members "a gentleman," a brewer, and a tailor, but there is no ground for supposing they were other than a race of thrifty and thriving tradesmen, with that fondness for Old Testament names belonging to those newly acquainted with the treasures of the English Bible.

Although certainty cannot be predicated there is little doubt that young Harsnett was educated at Colchester Grammar School. The history of that home of learning from 1539, when its Pious Founder, Henry VIII, gave the dissolved chantries of Joseph Elianore and others to the Corporation as an endowment, till the school was refounded by Queen Elizabeth in 1585, is somewhat obscure, but there is fair evidence for its continuity.

We know that Colchester, like the rest of England, was at this time the scene of much religious strife and discord. The Catholics were smarting under the drastic disendowment of the ancient faith, with the confiscation of their church goods and the bareness of the new services; the Protestants were still full of the horror and resentment caused by the recent terrible burnings, which had made the town notorious; while the bulk of the population were probably only anxious to be left alone, as far as possible, to tread in peace the old paths which their fathers trod.

Young Harsnett would doubtless drink in the story of the last thirty years from all points of view, but it seems quite possible that he may have been grounded by some pensioned Canon of St. Botolph's, not only in that sound learning which he found so useful in his after career, but in that tolerance for the faith and practice of the past which made him a pioneer in the reconciliation between the Church as Reformed, and the still numerous Church-Papists, as they were called, who ultimately realized the futility of resistance and conformed to the Common Prayer Book.

When fifteen, an age which seems to us absurdly young,

Harsnett was admitted as a sizar, or servitor, to King's College, Cambridge, on the nomination of Richard Bridgwater, of Bovill's Hall, Ardleigh, and of Dedham, who became a notable man in the academic world and a likely patron for a lad of merit. As Public Orator of the University he made a Latin oration to Queen Bess on **her** visit to Audley End.

The University reflected strongly the discords of the nation. The glorious King's College Chapel had only recently been purged of its "popish trash" by that iconoclastic prelate, Bishop Cox, of Ely, when its learned and benevolent Provost, Dr. Philip Baker, had fled, heart-broken, to Louvain, while Dr. Caius, the munificent founder of the College which bears his name, had also been forced to abandon his academic shelter. Dr. Bridgwater played a moderating part, but probably from dislike of the stern puritanism of Provost Roger Goade, of King's, Harsnett migrated to Pembroke Hall, where the future poets, Edmund Spenser and Gabriel Harvey (an Essex worthy), were then students. He may also have found a friend in the wife of Dr. Young, the Master of Pembroke, who had married a Mistress Cocke, from Colchester. In 1581 he proceeded B.A., and was elected Fellow of Pembroke in November 1583, receiving Holy Orders and taking his degree of Master of Arts in the following year.

When only 24 years of age he had the high honour of being selected as a preacher at St. Paul's Cross, a pulpit usually filled by the most powerful dignitaries of the Church. Here Latimer's stern warnings had turned Court, City and people towards the Reformation—here Bancroft four years later reasserted the doctrine of the Apostolic succession. With the ardent enthusiasm of youth, and a courage which never failed him, Harsnett took the bold course of challenging, in the face of all England, the dominant Calvinism of the day, preaching an eloquent sermon on the text from Ezekiel xxxiii. 11, "As I live, saith the Lord God, I have no pleasure in the death of the wicked, but that the wicked turn from his way and live; turn ye, turn ye from your evil ways, for why will ye die; O house of Israel?" Keble's Assize sermon started the Catholic movement of the 19th century as did Harsnett's that of the late 16th and 17th centuries.

So bold a challenge to the stern logical theology which the

keen intellect and devoted life of the great French Reformer had fastened on some of the finest minds and most powerful statesmen in France, Scotland, Holland and Switzerland, as well as on many of the greatest Englishmen of the day, brought down on the preacher a cautionary rebuke from the Primate Whitgift, but apparently did not otherwise affect Harsnett prejudicially, since his fellow townsmen, the Bailiffs and Council of Colchester, appointed him Headmaster of the Grammar School in March 1587; but learning, rather than the "painful trade" of teaching, was then his ambition and his destiny was to rule men rather than boys, so he resigned after 18 months' experience, and returned to Pembroke, having vainly endeavoured to secure the appointment of a successor, who also enjoyed the recommendation of the powerful puritan statesmen, our Recorder, Sir Francis Walsingham.

No doubt the young divine, play-fellow and lifelong friend of Sir Thomas Lucas, was present at St. John's when the Earl of Leicester was feasted there in December 1584, on his way to the Netherland, at the head of a gallant band which included that fine Elizabethan scholar and courtier, the translator of Plutarch's Lives, Edward North, who had married the widow of Harsnett's old patron, Dr. Bridgwater.

In 1592 Harsnett was elected Junior Proctor of his University, and in 1596 he again came forward as a champion of liberal views in support of Peter Baro, Lady Margaret professor of divinity, who had criticized adversely Whitgift's Calvinistic Lambeth Articles. His colleagues were those two eminent Anglican Divines, Lancelot Andrewes, Master of Pembroke, an Essex worthy, whose devotions still keep the affections of English Churchmen, and John Overall, afterwards the learned Bishop of Norwich.

Harsnett was now appointed Chaplain to Richard Bancroft, Bishop of London, and later Primate, whose genius and statesmanship fixed the hitherto wavering policy of the English church on the lines it has ever since retained. From him Harsnett received rapid promotion as Prebendary of St. Paul's and Arch-deacon of Essex, with a succession of livings, Chigwell, Shenfield, Hutton and Stisted, held, according to the bad custom of the day, in plurality, though not all at one time. It is not probable that he acquired much experience as a parish priest in view of

his public activities, but from his conscientious discharge of his other duties there is little doubt that he saw to the adequate performance of his cure by competent deputies. He settled at Chigwell, a district well known to the Essex Field Club, and a place for which he always cherished a deep affection. About this date he married Thomazine, widow of William Kempe, and daughter of one of the influential Waldegrave family, of Smallbridge, Bures, that charming medieval mansion which still defies the hand of time. His wife's family and connections had been ardent adherents of Queen Mary and the Papal party and suffered accordingly under Elizabeth's policy, but they were gradually becoming reconciled to the English Church. The marriage was evidently one of deep affection, but was only of short duration.

Harsnett now came prominently before the public as one of a Commission appointed to restrain certain clergy who roamed from town to town, claiming the power of exorcising demons from those "possessed," to the admiration of large and credulous crowds, then, as now, always seeking a sign from heaven.

He published a full account of his action, which resulted in the exposure of the imposture and the unfrocking of the fraudulent clerks. His only other book that has survived was printed in 1603, and was a learned and vigorous attack on the Jesuit plotters, who were busily endeavouring to bring the country again under Papal rule. On its literary side this work is of interest, as from internal evidence it has been shown that it supplied material to authors so diverse in many ways as Shakespeare and Milton.

We have authority for caution when all men speak well of us, and Harsnett was no exception. As licenser of books under the Primate he passed, without due examination, a work which incidentally dealt with that tabooed subject, the succession to the Crown. Though she was nearing the allotted span Elizabeth disliked, not only any reminder that she was mortal, but also that anyone should presume to offer an opinion on a subject on which she had not yet declared her mind, and for a few months visions of deprivation and committal to the Tower caused the Archdeacon much mental discomfort, but eventually the clouds rolled by.

In 1605 he was elected Master of Pembroke Hall, in succession to his friend, Lancelot Andrewes, now Bishop of

Chichester, whom four years later he followed also in that see. The cares of his dual office rendered the earlier one less successful than it might have been and led to many, possibly not unfounded, complaints.

As Vice Chancellor of the University he entertained King James, the British Solomon, accompanied by Prince Charles, with apostolic hospitality and noticeable dignity. He evinced his sturdy independence by his refusal to sanction the bestowal of honorary degrees indiscriminately, and went so far as to refuse the royal request made on behalf of John Donne, afterwards Dean of St. Paul's, notable alike as a preacher and a poet.

In 1619 he was translated to Norwich in succession to his friend Overall. Impartiality can hardly be predicated among 17th century historians, so we can scarcely expect a true picture of his rule over his two dioceses, of which the latter was one of the most puritan in the kingdom. We may at any rate remember that what his critics complained of was, not the enforcement of discipline in the abstract, but that it was enforced on the wrong people, that is, themselves. Be that as it may, the bishop was able to satisfy a strongly puritan Parliament that his course of action had been correct and justifiable.

Whatever the ultimate verdict of history may be as to the traditional position taken up by the Church of England as the *via media*, it was, with Harsnett and his better known, but not abler colleagues, Bancroft, Andrewes and Laud, the "articulus stantis aut cadentis Ecclesiæ," the very foundation of a standing or a falling church.

In 1628 Harsnett was again translated, now to the Chair of St. Paulinus and the archiepiscopal throne at York. His rule here was scarcely long enough to make much impression on his province, still the stronghold of the Roman Catholic party. His work was done, his health had become undermined and his spirits sank before the prospect, which as a Privy Councillor was now more than ever patent to his view, of the growth of opposition to the King's policy.

The Archbishop shared the political aspirations which led statesmen, in most European countries as well as here, to see in the strengthening of the royal prerogatives the only sure

antidote to papal autocracy; nor need we blame him if he was blinded by his age and strenuous life to the desirability of co-operating with that rising tide of political liberalism which influenced the sons of grave and cultured Elizabethan squires and thrifty merchants among whom his earlier years were passed. "The fathers had eaten sour grapes and the children's teeth were set on edge." After a vain search for health at the Bath waters the Archbishop turned homewards to his palace at Southwell, but died before reaching it, at Moreton-in-the-Marsh, Gloucestershire, on May 25th, 1631, within a month of completing his 71st year.

On June 7th, appropriately enough St. Botolph's day, he was buried, not amid the glories of York minster, but in the humble village church at Chigwell, "at the foot of Thomazine, late his beloved wife,"—a proof that the pride often associated with prelacy had not usurped the place of natural affection in the old man's heart. His will, made a few months before his death, is a characteristic document. Its opening sentence, "I die in the ancient faith of the true Catholic and Apostolic Church, renouncing from my heart all modern papal superstitions and all novelties of Geneva not accordant with the maxims of the Primitive renowned Church," indicates his consistent lifelong orthodoxy.

His desire that his brass should show him clothed in the ancient vestments appropriate to his Order as a Bishop, with his mitre and crosier, is valuable as the first, and for long the only, instance of an Anglican bishop, consecrated after the final breach with Rome, so depicted.

His poorer parishioners, his servants and his few surviving relatives all received full and appropriate benefactions, besides generous bequests of ornaments to the churches he had served. The childless old man had especially tender thoughts for the "poor scholars" at his recently founded Grammar School at Chigwell, whom he wished "nurtured and disciplined in good manners rather than instructed in good arts," much as he desired their liberal education.

His curious insistence on his "unworthiness" was surely no mock humility—conscious as he may have been of much falling short of his high ideals. We, who are perhaps more conscious of our neighbours' unworthiness than of our own,

may at least give him credit for sincerity, oddly as his epitaph may read.

The most notable provision in the Archbishop's will has yet to come. Following the example of his predecessor, Dr. Toby Mathew, who left his library to the city of Bristol, he gave "unto the bayliffes and incorporation of Colchester all my librarie of books provided that they prepare a decent room to sett them up in, that the Clergie of the Town of Colchester and other Divines may have free access for the reading and studieing of them."

Within six months the Council had ordered "that the east end of the Chamber over the Red rowe, called the Dutch Bay Hall, was a convenient place, being repaired, to put the Library." Apparently it was four years before they appointed a Librarian, one William Hall, a barber, or more probably barber-surgeon, with a stipend of 40s. per annum, to be paid by the Chamberlain quarterly, provided he entered into a bond for £40, for making good such books as should be lost or wanting.

The salary was not large, but it is a not uncommon illusion that the custody of books is in itself meat and drink! Anyhow, sixteen years later, in a fit of praiseworthy economy, the salary was halved, and in 1653 the books were given into the custody of the Vicar of St. Peter's, with instructions to make a catalogue—presumably at his own charge. Morant's sarcasm at the expense of the puritan self-sufficiency of the Magistrates is somewhat blunted when we find that the Royalist Corporation of 1664 bundled the books out of the Red Row, which they let, and put them in the Grammar School, where they remained for nearly a century, exposed to all the chances and changes which can affect the life of books. Sad to say also, it was a Church and Tory Corporation that refused to find the funds necessary to bring to Colchester the fine library left them by Bishop Compton in Queen Anne's reign. It was due to the munificence of Mr. Charles Gray, antiquary, bibliophile and philanthropist, that the Archbishop's books were, in 1749, suitably housed in the Castle, whence they were removed to the Public Library, and placed in a fire proof room, in 1894.

Lack of time prevents a detailed description of the library, but its contents justify the 17th century adage "*Clerus Anglie stupor mundi*"—Anglican learning is the wonder of the age;—

we need not speculate how far this tradition has been maintained but when we contemplate these massive folios we are able to gain some dim idea of what learning meant in the days of good Queen Bess," when Christendom had a common literary language and the inheritance of a common creed only shattered a few years before. The classics are well represented by Aristotle, Cicero, Demosthenes, Epictetus, Seneca and Thucydides. Of the Catholic fathers of the undivided Church Ambrose, Augustine, much quoted by rival partisans, S. John Chrysostom of the silver tongue, and Jerome are all present. The mediæval schoolmen, the intellectual flower of the ages of faith, include Saints Bernard and Thomas Aquinas, Peter Lombard Duns Scotus, the angelical doctor, and Richard Rolle of Hampole, our chief English mystic. One is a little inclined to wonder how far the civic fathers appreciated the "papistical learning" they so carelessly handled.

So far we have dealt only with the well-used library of a scholar of deep erudition, who, contrary to modern canons, did not hesitate to annotate his books; but there is a large section devoted to then current religious controversies, rusty weapons in a conflict now mainly dead and buried.

On the Roman side we have Cardinals Allen, Baronius, Bellarmine and Fisher, and the Catholic reformer, Erasmus, Anglicans of such varied hues as Gardiner, Cranmer, Jewel and Andrewes, but not the "judicious Hooker," while a volume containing eleven letters of S. Ignatius Loyola must have been like harbouring a theological bomb. Lutheranism is represented sparsely by the Augsburg Confession, Melancthon, and the Wurtemberg theologians; but the giants of the Calvinistic party are well to the front in Beza, Bullinger, Calvin and Zwingli, the protagonists in a conflict that for a time overthrew the national church in the next century.¹

Many and varied associations hang round these heavy tomes: here we have the signature of the martyred Cranmer, there the armorials of bluff King Hal and his lion-hearted daughter, of Robert Dudley, earl of Leicester, the Queen's suitor, and Sir Christopher Hatton, her nimble partner in the dance. Those of Archbishops Whitgift and Bancroft recall to our minds the famous library at Lambeth palace whence they came to the

¹A privately-printed "Catalogue of the Harsnett Library at Colchester" compiled by Gordon Goodwin, 1888, has been kindly presented to the Club's Library by Mr. Rickword.—
ED.

colleague and friend of those notable Primates. It is somewhat curious, as showing how one man so often enters into the labours and the reputation of another, that a large proportion of these books were formerly the property of a practically unknown Fellow of Pembroke Hall, a friend of Harsnett's, one John Field, whose autograph they bear. Like some "mute inglorious Milton" he may have rivalled the archbishop in his massive learning, but lacked that subtle quality which brings to the front those predestined leaders of men who loom largest in the public eye. Such was Samuel Harsnett, the baker's son, whose counsels influenced three, if not four, primates of All England and who was the trusted friend, not only of grave divines, but of courtiers such as Sir Thomas Lucas and William, earl of Arundel, who, to the pride of the Howards, added the culture of the first great art collector in England. Yet when all this is weighed, Samuel Harsnett would probably rather be remembered as following the apostolic injunction, the devoted husband of one wife, as the faithful friend of the parish priest of St. Mary's, Colchester, Master Thomas Talcoat, and as the humble penitent who freely gave of his treasure to the houses of God, and with his dying breath took thought for the poor widows and the simple scholars of his dearly loved Chigwell.

"Only the actions of the just
Smell sweet and blossom in the dust."

BIRD NOTES IN WANSTEAD PARK, FEBRUARY, 1877.

By THE LATE ARTHUR LISTER, F.L.S.

[The accompanying sketch, describing a winter ramble in Wanstead Park, was written by my father three years before the grounds were opened to the public; the place was then a wilderness, and the paths were overgrown, a dense undergrowth of bushes covered the slopes beneath the trees, and very few but the woodman, Puffitt, ever disturbed the solitudes beside the lakes. To-day the popularity of the Park has led to the disappearance of all aspect of wilderness in the grounds, and familiarity with man has rendered the herons much less shy.

GULIELMA LISTER.]

PROVIDED with a couple of pocket telescopes, and a small tin box for securing specimens, my companion and I start for a Saturday afternoon's stroll. The day has been fine, with a fresh wind that sounds through the trees and makes it a pleasure to step out briskly, and gives a feeling of new life after the muggy weather of this season of floods and storms.

We make our way to a park, not twenty miles from London, with a fine sheet of water which the wind is curling in ripples that break in noisy little waves on the further bank.

Of course we look out for water-birds, as we have so often done before—often indeed in vain, but not always so by any means ; scaups, pochards, and a fine Diver, made out with almost certainty to be the Black-throated, have rewarded us for weighting our pockets with a telescope. And now, is there anything for us to-day ? Yes, surely, don't you see him ? Not far from the shore a slender graceful bird that is down under water almost as soon as he is caught sight of : now out with the glasses, set for the right distance, and walk quickly while he keeps below. Up he comes again, a beautiful creature with long neck and long head and beak, the grey on the throat running back under the edge of the dark crown of the head almost to where the crest just projects behind, and which a puff of wind curls up and makes all the more apparent. Now he is down again without a splash or the least disturbance of the water ;—then we walk nearer and take out pencil and paper to note down the striking features as soon as he reappears. He rises again within easy range of the glasses and we remark the dark neck below the grey throat blending with wavy transverse lines into the pure white breast, the red colour of the sides of the neck, and the white on the wing joining the equally white under parts, giving the idea of the nearly black wings being tucked up on the back. The bird has the unmistakable aspect of a grebe, but which is it ? From the figure and description in Yarrell undoubtedly it is the Red-necked Grebe, *Podiceps rubricollis*, a rare bird, mentioned as having once or twice been seen before in Essex and reported to have been killed in some other counties in England, most frequently on the coasts of Northumberland and Durham.

We leave the elegant stranger, swimming with amazing rapidity into the middle mere, and we make our way to the woods.

Passing over what were once trimly kept lawns and flower gardens, now run wild and rank, rabbits skip across our path as we strike away to a wood gate that we see through the shrubs. We find it locked, but the iron-work has half dropped away and the gate seems not to have been opened for twenty years. But we have no great difficulty in gaining the coverts, where we meet the old woodman with his half dozen sturdy attendants. He regrets that he cannot go round with us and show us the beauties of the place, but it is pay day and he must be off to settle with his men.

However, we want no guide, so wishing him good-day we stroll on, well pleased to have our time to ourselves, and silence, without which few birds are seen to advantage.

In sheltered spots the broad arrow-shaped leaves of Lords and Ladies are already well above ground, though this is only the third of February, and blue bells are making a green carpet. Mosses dislike the smoke of London, and only a few of the hardy ones decorate our suburban neighbourhood, but we find several in fine fruit—the “undulated hair moss” being in great abundance. Before us on the lonely margin of the lake that we can now see stretching away in winding reaches hemmed in with wood, is a green slope that makes us look with smiling eyes ; it is gemmed all over with the “Chaste snowdrop, venturesome harbinger of spring and pensive monitor of fleeting years”—very beautiful, beside the old boathouse now falling somewhat to decay, with the grotto, where, years ago, merry parties gathered and watched the view over the fine stretch of waters.

As we cautiously thread our way among the trees the nut-hatch makes the woods echo with his clear loud call ; tit-mice are busy searching for their hidden prey concealed in the crevices of the bark ; a golden crested wren flits, uttering its small note, before us, and blackbirds and thrushes fly with scared chatter from our approach. Now we skirt the margin of the lake, putting up dozens of moorhens that flutter over the surface, just tipping the water with their long toes as they pass.

But what is that roar like the fall of a distant cascade ? At first it is a mystery, as surely no waterfall can exist in this level region, but a few steps further, and we hear the high clear notes of the starling above the tumult, and now we see the trees before us covered, as though with black foliage, with countless

thousands of these hardy birds, all in full chorus, having their last talk out before retiring to roost. As we approach, up they whirl in a dense cloud, and as they sweep round fill the air with the sound of their wings like the rush of a storm through the forest ; then they settle again and renew their wild converse. Listen to that harsh bark that can be heard above it all ; surely the herons are come back to their spring quarters ; no doubt about it, confirming what the woodman told that last Tuesday some thirty of these shy but conservative fishermen returned to their nesting trees. We have not gone far before their nests come in sight ; one or two long-legged fellows are standing on the homes of their future progeny, and with harsh cries flap their huge wings and are off. They had caught sight of us though we were two or three hundred yards away ; so now we stand close and watch. What numbers of red-beaked moorhens there are about, moving their pretty heads so regularly backwards and forwards as they glide along ; and look, swimming straight towards us and leaving a long track of ripple, is a water rat ; with the telescope we watch every marking and hair on his rough back, till round wheel the starlings again and we miss his last dive. Now the herons in numbers come back to their nest trees, and here and there one will settle, but most of them detect us though we are fairly hidden, and they are away again.

But it is growing dusk and it is time we were moving homewards. As we pass, flocks of redwings are trooping with their plaintive cry to roost ; a pheasant goes rocketting over the tree tops ; scores of wood-pigeons fly out, and it is evident we are intruders where solitude is accustomed to reign. So we work our way back to the open, and pass again the mere where the strong ripples catch the reflection of the red sun that is just going down behind the line of grey trees on the horizon.

We see our distinguished visitor rising and sinking on the waves far from the shore—and then we are back again to gas lights and almost London traffic.

A ramble such as we have attempted to describe gives a pleasure which we think few other sources are able to afford ; and for those who love the country and are apt sometimes to sigh for purer air, may we not rejoice that in the neighbourhood of this great metropolis and almost at our very doors, there still remains a store of nature's charms, which may fill the mind with as true happiness as the most rural spots can supply.

BRITISH OYSTERS : PAST AND PRESENT.

SUPPLEMENTARY NOTES.

By ALFRED BELL.

THE following notes mainly refer to the local distribution of the various groups, or isolated forms, present in the recent British Seas, or in the later Pleistocene and Holocene deposits.

In many localities, especially in the S. and S.E. of England and parts of Scotland given over to Ostraeculture, the original mollusc has been wholly or partially replaced by the introduction of Exotic types, but the earlier inhabitants can usually be determined by an examination of the dead shells often seen *in situ* between tide marks. To the Roman settlers in Britain is due the introduction of these culture nurseries in Kent (*ante*, p. 207), where they imported and raised their home favourites (Figs. 11, 13). I have found these introduced forms amongst Roman debris received from Folkestone, sent me by Mr. H. Warren, and from Verulam, given me by Mr. Bullen, of the Saint Albans Museum.

West Scotland is a veritable museum of ancient types and new arrivals. The Loch Sween *O. stentina* probably came with a large consignment of Arcachon shells which was relaid here, as I am informed by Mr. Calderwood, of the Scottish Fishery Board, to whom I am indebted for much information and the gift of specimens.

The shell is apparently one of the many modifications of a variable group, of which Monterosato enumerates a dozen. It does not quite agree with specimens of Arcachon oysters sent me by Mr. Robert Dollfus of the French *Bureau scientifique des pêches maritimes*, either in sculpture, the ribs being much closer and acute, or in colour. This may be due to environment, owing to the conditions under which the oysters are reared. Mr. Calderwood also found a small colony of quite recent date at Arisaig of a private inlaying from Colchester.

Some typical Carse Clay Oysters are of the old pointed "Pandoure" type but are smaller and stronger in the ribbing and evidently lived to a great age, if I may judge from specimens kindly lent me by the Geological Survey Museum, Edinburgh ;

they are quite unlike a series, sent me by Mr. Calderwood, obtained at a depth of 8—12 feet near the Bridge of Allan beyond Stirling, almost half way across Scotland. These are long, in proportion to breadth, but are of the true estuary type, not very large, $2\frac{1}{2}$ by $1\frac{1}{2}$ inches on an average.

Jura Oysters attained a fairly large size (one old dead valve I possess reaches to 5 by 4 inches diameter), and are often very fresh looking ; one specimen having a large double *Anomia* affixed to it. They are, like a large proportion of these western oysters, of the same class as those of the Estuarine Clays of the Nar Valley and the N.E. of Ireland. The deep sea Dogger and Welsh shell, var. *Tenbiensis*, is probably a surviving representative of this old group.

Some well marked sculptural features survived for a long period ; thus the Selsey type (Plate XV, fig. 16 *ante*) has its exact replica in a Nar Valley shell in the Norwich Museum. I have it from Jura in Mull. The beautifully ornamented (lower) valves are very shallow. A Jura shell of this type has the flat upper valve recessed into the lower one, a frequent habit in Western shells.

Another long lived type is a deep, almost hemispherical, basin-shaped shell with very pronounced sculpture, both in the Nar Valley and Loch Don in Mull, where the presence of the shell was unknown until Mr. Calderwood discovered their former existence associated with many pointed branches of trees, perhaps an early fascine to encourage their growth.

Natural agencies, including current action, have had much to do with the inbringing of Atlantic and Southern forms to our Western coasts such as the *O. scaeva* to which I have already referred, and which has been sent me by M. Dautzenberg from St. Malo, *O. cochlear*, *O. atlantica*, and the beautifully coloured and delicately ornamented *O. Montagui* and *O. Devonensis*. Turton's *O. parasitica* on floating timber (p. 194 *ante*), may be another example.

At what particular period of our geological history the pointed Rutupinian type made its appearance is not very apparent. Its distribution in one or other form, for the type is variable, over such a wide area from the Thames mouth to S. and W. Scotland, presumes a great antiquity. The English type goes back as far as the March gravels. It is closely related to the

variety *lincta* and even if it prove to be the same there is sufficient difference to make a distinctive name useful for reference.

The "Pandoure" or Forth Shells seem to have been very plentiful at one time, although, unless replaced, nearly absent from the Forth waters through want of care in dredging. Mr. Calderwood tells me that in the season as many as thirty smack loads were sent to London. Odd valves of this larger type are occasionally found in the later London debris, and have got confused with our own genuine var. *Rutupina*. Its consumption in the Scottish capital seems to have been stupendous, as my informant tells me that in clearing the site of an old tavern, the workmen had to cut through a bed of shells 15 feet thick; the relics of many an old time feast! I have not seen this Rutupinian type from any continental locality. The common edible oyster (*ante* p. 193) of our eastern coasts probably originated in the North Sea as a deep-sea shell, some examples obtained from an old site near the original mouth of the Alde River having their irregular manner of growth.

The shell here called var. *Celtica* (p. 200 *ante*), had its metropolis, and probably its origin, in the far North. It abounds in the Shetlands. One of this type was figured by Dr. Oyen of the Christiana Museum from Vandelsbakken in Nordhjem the most northerly locality to which the oyster has been traced. I have a good example from Uddevalla.

Profiteering in Oysters was not unknown in olden days. A certain Roger Calf was in A.D. 1375 presented before one of the Norwich Leet Courts for forestalling, otherwise cornering, the market, so that "whereas the people had been wont to have 100 oysters for 1½d," Roger sold them at an advance for 2d. or 3d.

Two pence for the long hundred (120) seems to have been the normal price for the next two hundred years.

Gadwall in Essex.—On November 7th, 1920, I observed two Gadwall (*Anas strepera*) on the lake in Navestock Park, Essex. . . . The only record I can find of this species in the County since *The Birds of Essex* was published in 1890 is that of one obtained at Manningtree in Dec. 1913 (*British Birds*, vii., p. 323), and Mr. Miller Christy (*Vict. Hist. Essex*) describes it as a very scarce winter visitor.—WILLIAM E. GLEGG, in *British Birds*, xiv., p. 188.

A MS. ESSEX FLORULA.

BY PROF. G. S. BOULGER, F.L.S., F.G.S.

IN the "Abbreviations" in Gibson's *Flora of Essex* (1862) p. xx., appears the entry "W. C. . . . * Coleman, W. H., M.A., one of the authors of the Herts Flora—List of plants near Dedham," the asterisk marking "Clergymen," as is stated on the previous page.

In the List of Correspondents in the second part of Watson's *Topographical Botany* (1874), p. 551, the Rev. W. H. Coleman is credited with catalogues communicated from nine vice-counties ; and in the "Explanations of the Catalogues," pp. 520-1, these are described as (i.) a London Catalogue (ed. ii.), checked for plants seen near Minehead and Dunster, South Somerset, in 1847 ; (ii.) a manuscript catalogue of plants of East Grinstead, East Sussex and Surrey ; (iii.) a manuscript catalogue of plants observed near Dedham, in the counties of Essex and Suffolk (east and west ?), no date, but probably made in 1837 ; (iv.) a manuscript catalogue of plants within five miles of Hertford . . . during 1838 and 1839 . . . "a forerunner of the *Flora of Hertford*, the joint work of Webb and Coleman . . . a well worked out Flora" ; and (v.) a London catalogue (ed. ii.), checked for plants seen in the neighbourhood of Ashby-de-la-Zouch, in the county of Leicester. Watson adds "In her *Flora of Leicestershire*, Miss Mary Kirby had the efficient aid of three clerical botanists, Bloxam, Coleman and Churchill Babington."

In the library of the Kew Herbarium is a manuscript *Flora of East Grinstead*, 1836, probably No. ii. of the above and acquired with Watson's herbarium ; and most probably i., iv. and v. are also there among Watson's papers, if they have survived the holocaust referred to in the *Journal of Botany* for 1881, p. 263. Coleman's contributions to the list of Cambridgeshire plants appear in the Supplement to Watson's *New Botanist's Guide* (1837), vol. ii., pp. 598-601, as is mentioned in Babington's *Flora of Cambridgeshire* (1860), p. xi.

In August 1920, the Rev. E. Foord-Kelsey, Rector of Kimble, Bucks, purchased in Aylesbury for sixpence what is perhaps No. iii. in Watson's list above summarised. Although apparently communicated, at least in substance, to both Gibson and Watson.

this little book is of considerable interest, and Mr. Foord-Kelsey has determined to present it to the Botanical Department of the British Museum. Before doing so, however, he has kindly permitted me to examine it, and to exhibit it at a meeting of the Essex Field Club.

The manuscript is very neatly written on one side (save for occasional additions) of 41 octavo pages, bound in cloth with about a dozen blank pages at the end, and lettered on a label outside "Flora of Dedham." Before the actual Flora, which is arranged according to the Natural System under Dicotyledones, Monocotyledones and "Acotyledones or Acrogenæ," there are some three pages of introduction, which, with the title-page, I will transcribe as illustrating the careful methods of the author:—

"A Catalogue of Plants growing wild in the basin of the Stour, in the Counties of Essex and Suffolk, in the neighbourhood of Dedham, Essex. From observations made in the year 1837, by W. H. Coleman, B.A., of St. John's College, Cambridge, late Assistant Master of Dedham School. Hertford, MDCCCXXXVIII.

"The observations recorded in the following Catalogue were made during a residence at Dedham in the year 1837. The greater part of the stations assigned are in the Basin of the Stour, *i.e.*, in the district whose drainage is towards that river or its tributaries. It was intended to have confined the Catalogue to the plants found within this space; but the desire of including several plants of some rarity (*Anthemis nobilis*, *Inula pulicaria* and *Mentha Pulegium*) has, I believe, led me a little beyond the summit level between the Stour and Coln; and having thus transgressed, I have felt less compunction in inserting some outlying stations of other rare species, which do occur in the basin of the Stour. No observations have been made westward of Stoke-by-Nayland church, or eastward of Wrab Ness.

"The river Stour appears to be the boundary between two different geological formations. That on the South, or Essex side, is a heavy retentive clay; being, I believe, the Blue or London Clay: while to the North the subsoil is of a more loamy character, belonging to the plastic clay formation: white bricks are made of this clay at Higham. Both of these strata are often covered to a considerable depth by beds of gravel, as at the Gun Hill, &c. In the North East quarter, in the neighbour-

hood of Bentley and Tattingstone, the clay is covered by the beds of the Crag formation, abounding in organic remains.

“ In connection with the geology of the country, the Alder Cars, which here form a peculiar feature, deserve mention. In most districts the swampy declivities of hills where springs abound are occupied by bog ; but the Cars, which here hold this position, are deficient in the two characteristics of bog, iron and the moss *Sphagnum*. The want of the former I take to be the cause of the absence of the latter ; but this I cannot positively assert.

“ The number of species included in the list is 592. Of these about 35 are due to the presence of salt water ; but, even when these are deducted, the number (557) considerably exceeds that of the species which fell under my notice in an equal space of time at East Grinstead, in Sussex (520), and at Hertford (510). The neighbourhood of Dedham may therefore be fairly considered as a productive botanical country, notwithstanding the absence of many species from the total want of chalk and bog, and the great scarcity of heath. But nevertheless, I am far from supposing that I have thoroughly examined the country ; and I have no doubt that a careful observer will be able to add many new species, as well as many stations of the rarer ones, which have either been overlooked or removed from my notice owing to my absence from Dedham for nearly two months at the height of the season. I have since had experience at Hertford, where a second year has added upwards of 100 species to those observed in the first.

“ With respect to the words ‘common,’ ‘frequent,’ &c., used to denote the comparative frequency of the species, I must beg the reader’s indulgence for inaccuracies which (owing to my short residence in the vicinity and my absence before mentioned) could hardly be avoided. Thus I find myself totally unable to say whether *Chrysanthemum leucanthemum* is a rare or common plant ; it flowered during my absence, and I saw it in two or three places only after my return : and the same is the case with several others. Several species are in all probability confined to one side of the Stour ; but I am not able to point out these farther than is done in the Catalogue. Few of the plants enumerated are particularly rare : I have added at the end of the work a list of such of them as are considered least

common by Watson in the *New Botanist's Guide* ; as also of the more common ones which are wanting in the district examined.

“ My very imperfect knowledge of the names of the lanes, farm-houses and other localities, has forced me to use much circumlocution in describing stations. To diminish this I have frequently coined names for remarkable localities, or used them on imperfect information. These names I have explained below ; but I am afraid that there will still be much obscurity in this respect. W. H. Coleman.”

From the language of this preface it was obviously written with a view to publication ; and, as Watson speaks of the list he saw as undated, it was not then in its present form. The lists of rarer species and of absentees alluded to, do not appear to have been added, though there is a complete “ Index of Genera ” at the close of the manuscript.

Referring as it does to an area intermediate between that dealt with by Dale in his edition of Taylor's *History of Harwich* and that in which Joseph Andrews's Sudbury herbarium, described by me in the *Journal of Botany* (1918, pp. 294, *et seq.*), was collected, this Florula is of great local interest. Gibson has very seldom transcribed its stations (which are all in his District 8) at all fully ; but that the manuscript remained some time in its writer's possession is shown by his pencilled correction of *Ænanthe Phellandrium* and *Æ. Pimpinelloides* to *Æ. fluviatilis* and *Æ. Lachenalii*, whereas it was not until 1844 that he first described *Æ. fluviatilis* in the *Annals of Natural History* (vol. xiii. p. 188). As in several places “ Mr. Hurlock's ” has been altered in pencil, possibly in another hand, to “ the Lecturer's,” it looks as if the manuscript may have been used as the basis for a lecture by this person.

As to the writer of the Florula, William Higgins Coleman was born apparently in 1816, and was associated, whilst still an undergraduate at St. John's College, Cambridge, with J. W. Colenso, afterwards Bishop of Natal, in the well-known *Examples in Arithmetic and Algebra*, published at Cambridge in 1834. He graduated B.A. in 1836, proceeding M.A. in 1838. Judging from the introduction to his *Flora of Dedham*, he was at East Grinstead for most of 1836, possibly in a scholastic post ; at Dedham Grammar School during 1837 ; and at the junior school of Christ's Hospital, at Hertford, from 1838 to 1847. From his

first arrival at Hertford he would seem to have been collecting materials for the *Flora Hertfordiensis*, which he published in conjunction with the Rev. Robert Holden Webb, who became Rector of Essenden, near Hatfield, in 1843. This was the first county Flora to be sub-divided by river-basins; and it has an introduction on the physical geography and botanical divisions of the county, written by Coleman, in 1846, and embodying the substance of a paper by him on the Geographical Distribution of British Plants in the *Phytologist* for 1848 (vol. iii., p. 217). A supplement to this *Flora* was published in 1851; but in 1847 Coleman became an assistant master at Ashby-de-la-Zouch Grammar School, so that his work was transferred to Leicestershire. Besides his assistance to Miss Kirby's *Flora*, alluded to by Watson, he contributed notes both on flowering plants and mosses to the Flora of Tutbury and Burton-on-Trent, by Edwin Brown, which was published in Sir Oswald Mosley's *Natural History of Tutbury*, 1863. Coleman died at Burton-on-Trent, September 12th, 1863.

THE ESSEX FIELD CLUB—REPORTS OF MEETINGS.

ORDINARY MEETING (521st Meeting).

SATURDAY, 30TH OCTOBER, 1920.

This meeting was held as usual in the Physical Lecture Theatre of the Municipal Technical Institute, Romford Road, Stratford, with the President, Mr. Robert Paulson, F.L.S., F.R.M.S., in the chair. 50 Members were present.

The following were elected MEMBERS of the Club:—

Miss Jane Bishop, B.A., of 347, *Central Park Road, East Ham, E. 6.*

Miss Gertrude A. Bray, of 5, *Khedive Road, Forest Gate, E. 7.*

Miss Maud J. Foster, 112, *Thurlow Park Road, Dulwich, S.E.*

Miss Mary E. Gullick, of 50, *Osborne Road, Forest Gate, E. 7.*

Miss Gertrude M. Hart, of 73, *Windsor Road, Forest Gate, E. 7.*

Mr. Alfred C. Brown, of 58a, *Montpelier Gardens, East Ham, E. 6.*

Mr. George J. Cooper, of 33, *Woodford Road, Forest Gate, E. 7.*

Mr. Sydney Dickinson, of 220, *Battersea Bridge Road, Battersea, S.W.*

Mr. Guy Maynard, of *The Museum, Ipswich, Suffolk.*

The Curator exhibited some fine specimens of the mycetozoans, *Trichia varia* and *Tubifera ferruginosa*, which had been presented to the Club's Museum by Miss G. Lister, who made some remarks on the specimens.

Mr. Stanley Austin exhibited the identical albino blackbird noted

from Loughton last year,¹ and presented the skin to the Museum in the name of Dr. Millais Culpin, of Loughton.

Mr. D. J. Scourfield exhibited some larvæ of *Anopheles plumbeus* under the microscope, and remarked on the use which the creatures make of the surface-film of water by means of the paired tufts of "float-hairs" on the third, fourth, fifth, sixth and seventh abdominal somites. Mr. Scourfield also showed some living colonies of the rotiferon *Conochilus volvox* from High Beach.

Mr. C. Nicholson exhibited a living colony of a species of *Aphis* on a twig of willow from Woodford, with attendant wasps, *Vespa vulgaris* and *V. germanica*.

Mr. H. Whitehead exhibited a green turbellarian worm, *Typhloplana viridata*, from High Beach, and described the occurrence of algal cells within the body of the creature.

Mr. J. Avery exhibited a special series of rare prints of Essex from his private collection, as under:—

CHINGFORD CHURCH.

Drawn on stone by Mr. Lequentre:

Published by R. Ackermann, 96 Strand.

BRENTWOOD CHAPEL, erected 1835.

James Savage, Architect: H. B. Savage, del:

Drawn on stone by W. Walton. Printed by C. Hullmandel.

"*Warley Ho.*" (A satirical sketch of a man and woman riding horseback).

Issued by James Bretherton, 23rd January, 1782. Mr. Bunbury, del.

WANSTEAD HOUSE: belonging to the Rt. Hon. the Earl of Tylney.

Large drawing $26\frac{1}{2} \times 16\frac{1}{4}$.

[Probably published in Florence about 1750.]

WANSTEAD HOUSE.

Drawn on stone by J. M. Baynes from a sketch taken in Nov. 1823.

Printed by C. Hullmandel and published by D. Walther, December 1823.

WANSTEAD GROVE.

A set of four drawings by the Honble. Anne Rushout. On stone by W. Gauci.

Printed by Engleman & Co., Soho.

THAXTED CHURCH, NORTH VIEW.

A Baldrey, delin. T. White Sculp.

Dedicated to the Rt. Honble. Charles Lord Maynard.

ABBEY OF WALTHAM HOLY CROSS: SOUTH-EAST PROSPECT.

James Peak: delin. et. Sculp.

Sold by J. Boydell: 1763.

AUDLEY END, WEST FRONT OF.

From an original drawing by I. Wallis.

Engraved by F. J. Sarjent.

Published Jan. 1, 1810, by J. Wallis, Saffron Walden.

HALSTEAD, HOLY TRINITY CHURCH.

Lithographic drawing by G. Hawkins.

Published by Day & Hughes.

¹ *Essex Naturalist*, xix., Part 3, p. 171.

ST. BOTOLPH'S PRIORY, COLCHESTER, NORTH WEST VIEW of the Ruins and the New Church of St. Botolph's, July 1837.

Day & Hughes, Lithrs., drawn on stone by Deason from a sketch by Mrs. J. Round.

DUNMOW CHURCH, SOUTH VIEW.

Lithographic drawing by Arthur Barfield.

HATFIELD CHURCH, NORTH-EAST VIEW.

Lithographic drawing by G. Lungley & Skelton.

DEBDEN [CHURCH].

Drawn by J. C. Barrow, F.S.A., Engraved by G. I. Parkyns.

Published December 1st, 1791.

THE PROSPECT OF THE DWELLING HOUSE OF HENRY WINSTANLEY, GENT. AT LITTLEBURY, ESSEX.

HOTEL AT COLCHESTER.

Lewis Cubitt, Architect. J. T. Bury, Lith.

CASTRI. COLNCESTRENSIS ARCIS OLIM ROMANORUM

Munitissimæ, rudera ab. ulterioribus temporis et bellorum vastationibus Societas. Antiq. Lond. ita conservari curavit. A.D. 1732.

T. Whood, del.

Thanks were accorded to the various donors and exhibitors.

The President called upon Mr. Joseph Wilson, who read his report as Club's delegate to the Annual Conference of Corresponding Societies at the British Association Meeting in Sept., 1920 (printed, *ante*, p. 270).

On the President's motion, the cordial thanks of the meeting were given to Mr. Wilson for his report.

Mr. Hugh Main gave an interesting account of "The Life History of the Ant-lion (*Myrmeleon*)," illustrating his remarks by a series of lantern photographs taken by himself. In further illustration of the subject, Mr. J. Seabrook exhibited some preserved *imagines* of ant-lions, and referred to their abundance in Egypt and Palestine.

Mr. H. Whitehead read a paper "More about Moorlog: a Peaty Deposit from the Dogger Bank," which he illustrated by a chart and lantern diagrams, as well as by numerous specimens of plant seeds, beetles and other organic remains found in the deposit. At the conclusion of the paper (which is printed in full, *ante* p. 242) Mr. Scourfield made some remarks on the entomostracan fauna of the peat, so far as yet determined; he reported that of the 18 species, nearly all were cladocera, there being only two ostracods and not a single copepod. One of the ostracods was a brackish water form, the rest being all freshwater species.

After an interesting discussion, Mr. Whitehead was heartily thanked for his communication and the meeting terminated.

CRYPTOGAMIC FORAY—THEYDON BOIS TO HIGH BEACH (522nd Meeting).

SATURDAY, 13TH NOVEMBER, 1920.

A dull morning, threatening rain, and culminating in a heavy downpour about noon, gave place to a most glorious sunny afternoon, with gorgeous colour-effects on the autumn foliage not yet fallen from the trees, and

rewarded the 40 Members and friends who "carried on" throughout the day of the Club's annual cryptogamic foray.

The referees for the day were:—

For mosses and hepatics: Mr. L. B. Hall, F.L.S., and Mr. W. R. Sherrin, A.L.S.

For lichens: Miss A. Lorrain Smith, F.L.S., and the President, Mr. R. Paulson, F.L.S., F.R.M.S.

For fungi and myxomycetes: Miss G. Lister, F.L.S.

The route chosen was from Theydon Bois to High Beach; the heavy rain of the morning made it desirable to keep fairly close to the roads, whence, however, frequent short divergencies into the thickets were made for collecting purposes.

The headquarters were, as heretofore, at the Roserville Retreat, High Beach, and here a goodly show of interesting finds was made during the afternoon.

Tea was served at 4.15 o'clock, after which a formal meeting (the 522nd) of the Club was held, with the President in the chair.

Miss Ethel M. Mathias and Mr. Albert James Nunn, both of 45, *Hargwyne Street, Brixton, S.W. 9*, were elected Members of the Club, and four candidates were nominated for election.

The President called upon each of the referees in turn for a report on the day's finds.

Miss Lister reported that 11 forms of myxomycetes had been met with, a poor yield due to the dry weather which, until that morning, had persisted for some weeks. Of these, only two *Badhamia panicea* and *Diderma radiatum* var. *umbilicatum* had not been recorded at the fungus foray of last month. Turning to the fungi, she called attention to several of the agarics on the tables and specially to the fine specimen of woody mycelium of *Armillaria mellea*, and referred to the aid which this rhizomorph yields, in Japanese forests, to epiphytic orchids in obtaining their nitrogenous food.

Mr. Hall announced that 42 species of mosses and hepatics had been found during the day, including *Zygodon Forsteri* in vigorous condition in one of its old stations.

Mr. Sherrin reported that some interesting forms of *Sphagnum* had been met with, but required more minute study to determine their specific and varietal identity. He remarked that the specimen of *Sphagnum fimbriatum* found at last year's foray appeared to be a new record for the county.

Mr. Paulson, in Miss Lorrain Smith's absence (she having had to leave earlier on account of poor health), spoke eulogistically of her work in lichenology, and reported that 20 named forms of lichens had been recorded during the day, mostly ground forms or "soil-lichens." Mr. Paulson made some remarks on the sporulation of the algal-cells within the lichen thallus, to be seen in sections of the thallus cut from near the tips of the branches, as many as 32 daughter-cells having been seen; he added that his observations had been confined to those lichens having as their constituents the green algæ (Chlorophyceæ) *Chlorella* and *Protococcus*, the latter of which occurs in very few species, while the former is almost ubiquitous.

The meeting concluded with a vote of thanks to the conductors, proposed by the President, which was heartily accorded by those present.

The return walk to Loughton, through the darkened forest, under a clear starry sky, with the crescent moon sinking behind the black tree-masses, was not the least enjoyable part of a pleasureable day.

ORDINARY MEETING (523rd Meeting).

SATURDAY, 27TH NOVEMBER, 1920.

This meeting was held at 3 o'clock on the above afternoon in the Municipal Technical Institute, Stratford, the President, Mr. Robert Paulson, F.L.S., F.R.M.S., in the chair. The attendance was 42.

The following persons were elected Members of the Club:—

Lady Lloyd, of *Roll's Park, Chigwell*.

Miss C. Osmond, B.Sc., of 36, *Hanley Road, Finsbury Park, N.4*.

Miss Winifred Smith, B.Sc., of *University College, Gower Street, W.C.1*.

Mr. Alfred Bell, of *Oakland House, Cringleford, Norwich*.

Mr. John Avery exhibited a further series of Essex prints.

The Curator exhibited a fine polished section of trunk of walnut (*Juglans regia*), which had been presented to the Club's Museum by Mr. Walter Fox, who contributes the following account of the exhibit.

The section came from one of seven trees which were growing near an old farm house, known as "Frizlands," Dagenham, and are believed to have been planted by one Joseph Joyner some 3 or 4 years after he came to reside there in 1790. Joyner came from West Thurrock and purchased the Manor of Frislings, as it was then known. The mansion in those days must have been of considerable size, but the building has been reduced and the old parts incorporated with what is now a moderate and unpretentious farm house. A novel feature about the house is an arrangement of strong rooms in the basement, which were built by Joyner to store money, valuables and documents. Joyner was a banker, carrying on business at Romford Town (reputed to be the first bank in that town), and made it a practice to bring over daily, after business hours, all monies and documents to "Frizlands" for safety. The bank is now one of the numerous branches of "Lloyds."

The Curator also exhibited a fine specimen of the Great Northern Diver (*Colymbus glacialis*), shot in Iceland about 1888, and in full summer plumage, which had just been presented to the Club's Museum by Sir Rickman Godlee.

Mr. Thompson further exhibited two Cornish Choughs (*Pyrrhocorax graculus*) which he had recently acquired for the Museum by purchase. Mr. Miller Christy remarked on the disappearance from the Cornish cliffs of these birds which he ascribed to interference by jackdaws, which were increasingly numerous.

Miss G. Lister exhibited a rhizomorph of the agaric, *Armillaria mellea*, and also, under a microscope, a section of the root of the Bird's nest Orchis, showing the mycorrhiza or fungus-hyphæ in the cortical cells; she remarked that this constituted an example of "two-sided parasitism," as the mycorrhiza enter the root of the orchid and feed on the carbohy-

drates, while the orchid-root obtains mineral substances by aid of the hyphæ which are derived from leaf mould.

Mr. Hugh Main showed three formicaria containing living ants, together with the commensal beetle-larva *Clythra quadripunctata* and also empty puparia of the syrphid-fly *Microdon mutabilis*, both of which occur in ants' nests.

Mr. Mothersole exhibited, and presented to the Club's Museum on behalf of friends at Chelmsford, a series of photographs of birds and their nests, taken from nature; and also a "bye-gone" in the form of a candle-lantern.

On the President's proposition, the thanks of the Club were accorded to the several donors and exhibitors.

The President called upon Mr. J. Avery, who read a paper on "Jabez Legg, a Forgotten West Ham Worthy," illustrating same by a series of lantern photographs.

The thanks of the meeting were passed to Mr. Avery for his communication.

Mr. Percy Thompson read, in abstract, a paper "On Another Annotated Copy of Warner's '*Plantæ Woodfordienses*,'" which he illustrated by the exhibition of photographs and by some lantern photographs and other exhibits. In further illustration, Professor Boulger exhibited Edward Forster's interleaved and annotated copy of Turner and Dillwyn's *Botanist's Guide*, and added some biographical notes on Forster; and Miss G. Lister exhibited a copy of Linnæus' "*Tour in Lapland*" (published as an English edition in 1811), which was dedicated by J. E. Smith to Thomas Furlly Forster.

The President, in proposing a vote of thanks to the reader of the paper, made some remarks on the sudden appearance of uncommon plants in Epping Forest in recent times, evidently by human agency.

The meeting then terminated.

ORDINARY MEETING (524th Meeting)

SATURDAY, 29TH JANUARY, 1921.

This meeting was held at 3 o'clock on the above afternoon, in the Municipal Technical Institute, Romford Road, Stratford, the President, Mr. Robert Paulson, F.L.S., F.R.M.S., being in the chair. 80 Members and friends were present.

Miss Winifred K. Howard, of 241, *Coventry Road, Ilford*, was elected a Member of the Club.

The Hon. Librarian announced recent presentations of books to the Club's Library, made by Miss G. Lister and Mr. H. W. Lewer, and thanks were accorded to the donors.

A lantern demonstration on "The Egg-laying of *Polydesmus*," was, in the unavoidable absence of Mr. Hugh Main, given by his daughter, Miss Muriel Main, who merited the hearty vote of thanks which her *débüt* as a lecturer inspired.

Miss G. Lister read some "Notes on the Hedgehog," and exhibited, in illustration of her remarks, a family of hedgehogs, comprising the mother

and six young ones, only three days' old, which had been born in a hay shed at Whipp's Cross during 1920. An interesting discussion ensued on the habits of hedgehogs, in which Miss Willmott, Sir R. Armstrong-Jones, Mr. Miller Christy and Mr. Thorrington, took part; and a cordial vote of thanks was passed to Miss Lister for her communication.

The President then called upon Mr. Miller Christy, who gave "A chat on some Cornish Gardens," which he had recently visited, illustrating the subject by a series of lantern photographs and by a selection of living plants which had been sent up specially by Miss K. Skinner, from Cornwall. After the lecture, Miss E. Willmott read some interesting notes on the history of the principal Cornish gardens, with anecdotes of their owners.

The cordial thanks of the meeting were accorded to Mr. Miller Christy, to Miss Willmott, and to Miss Skinner, and the hour being now late, the meeting terminated.

VISIT TO THE BOTANICAL DEPARTMENT, BRITISH MUSEUM (525th Meeting).

SATURDAY, 12TH FEBRUARY, 1921.

Some 40 members and friends attended this meeting, which was arranged in response to a kind invitation from Dr. A. B. Rendle, M.A., F.R.S., F.L.S., the keeper of the Department of Botany.

Assembled at 2.30 o'clock at the entrance to the Department, the visitors were received by Dr. Rendle, who, in welcoming the party, called attention to the two-fold work of his department in catering for the "man in the street," and also for the informed student of botany.

The President (Mr. R. Paulson, F.L.S.), in reply, thanked Dr. Rendle for his kindly reception of the Club.

The visitors were then conducted to the British and European Herbarium, where Mr. A. J. Wilmott, B.A., F.L.S., exhibited various specimens of dried plants from Philip Miller's Herbarium, from Forster's Herbarium, some as yet undetermined plants from Macedonia, and the collection of plant-seeds which he is in process of forming. He also showed some of James Sowerby's original drawings for *English Botany*, 1790-1814, upwards of 2500 of which were purchased by the Museum in 1859-1862.

The size of the party rendered it desirable to split up into two groups, one of which continued under the conductorship of Mr. Wilmott, making its way through the public gallery into the Library. Here, Mr. Wilmott exhibited Fuchs', Brunfels' and Gerarde's Herbals, and also the Sloane Herbarium with Sloane's careful collating of his specimens with John Ray's *Historia Plantarum*, 1688, by means of cross-references.

Ettingshausen's volume of nature prints of plants was curiously examined; and general admiration was aroused by the beautifully finished drawings of F. P. Nodder, James Miller and other artists commissioned by Sir James Banks to elaborate the sketches, made by S. Parkinson, of the plants collected during Captain Cook's first voyage, 1768-71, of which sketches the Museum possesses no less than nineteen volumes.

In the name of the party Mr. Percy Thompson expressed thanks to Mr. Wilmott for his kindly services during the visit.

Meanwhile, the other group of visitors had made its way to the Cryptogamic Herbarium, where Mr. J. Ramsbottom, M.A., F.L.S., took charge.

Mr. Ramsbottom commenced by briefly describing the general arrangement of the cryptogamic herbarium ; and exhibited various illustrations of agarics by Worthington G. Smith, Dr. M. C. Cooke, Massee and others, pointing out that the fungi were usually more easy of identification by means of these beautifully coloured drawings than by book-descriptions. Specimens of woody fungi were exhibited to illustrate the methods of mounting and labelling adopted, and attention was drawn to Sydow's *Sylloge of Fungi*, in 15 volumes, by reference to which the position of any fungus-specimen in the Herbarium could be found.

Mr. Ramsbottom exhibited to the visitors the " gingerbeer plant," which is often brought to the Museum by ignorant persons as an insect product, under the names of " Californian bees," " Belgian bees," etc. ; he referred to the work of Marshall Ward in 1892, who showed that the essential constituents of the " gingerbeer plant " are a yeast (*Saccharomyces pyriforme*) and a bacterium (*Bacterium vermicforme*) acting symbiotically and producing fermentation.

A large number of tropical forms of sclerotia of *Cordyceps* was shown to the party, as also the large sclerotium, known as " black-man's bread," and " white-man's bread " ; and Mr. Ramsbottom remarked on the recently recognized importance of the mycorrhiza of fungi in the cultivation of orchids.

A cordial vote of thanks was accorded, on the President's motion, to Mr. Ramsbottom for his interesting and instructive remarks on the specimens exhibited.

The party then separated.

ORDINARY MEETING (526th Meeting).

SATURDAY, 26TH FEBRUARY, 1921.

This meeting was held, as usual, in the Physical Lecture Theatre of the Municipal Technical Institute, Stratford, at 3 o'clock on the above afternoon, with the President, Mr. Robert Paulson, F.L.S., F.R.M.S., in the chair. 56 members and friends attended.

The President welcomed, in the name of the Club, the Members of the Walthamstow Natural History Society, present by invitation. At a later stage, Mr. C. Nicholson, as hon. secretary of the Society, expressed the thanks of his Members for the welcome accorded.

The following ladies and gentlemen were elected Members of the Club :

Miss Dorothy Minn, of 187, *Coventry Road, Ilford*.

Miss Alice E. Trappitt, of 2, *Airlie Gardens, Ilford*.

Mr. Robert Patterson, M.D., of *Gillwell Park, Sewardstone, Chingford*.

Mr. Alfred Scott, of 134, *The Grove, Stratford, E. 15*.

In anticipation of the approaching annual meeting, nominations were made for new Members of Council and Officers for the ensuing year.

Mr. E. T. Newton exhibited a metacarpal bone of an ox, from near Cromer, which had been curiously gnawed by rodents.

Mr. Nicholson exhibited a nest of *Vespa germanica*, which he had taken from the clayey bank of a pond at Oak Hill, Woodford, on October 24th, 1920. He also exhibited specimens of various parasites or commensals of wasps and their nests, including the beetle *Metæcus paradoxus*, larvæ of another beetle, a species of *Cryptophagus*, some mites (*Glycyphagus*), the ichneumonid *Sphecophaga vesparum*, and the dipteran *Volucella pellucens*.

The President exhibited a large series of British lichens which, as duplicate specimens from the national collection, had been that morning granted to the Club's Museum by the Trustees of the British Museum.

Mr. J. H. Owen then gave a lecture entitled "Further Notes on the Sparrow-Hawk," which he illustrated by a series of some 80 lantern photographs of exceptional merit. At the close of a very interesting lecture, a discussion ensued, in which Messrs. Miller Christy, Glegg, Horn and Thompson, and Miss Hibbert-Ware, took part; and Mr. Owen replied to the numerous questions asked.

A hearty vote of thanks was passed to Mr. Owen for his lecture, and the meeting terminated.

EASTER VISIT TO COLCHESTER (527th Meeting).

THURSDAY, 24TH MARCH TO MONDAY, 28TH MARCH, 1921.

By various routes and at different times on the appointed Thursday, the Members of the party made their way to the Red Lion Hotel in the High Street until, as Chaucer has it:—

"At night was come in-to that hostelrye
Wel nyne and twenty in a companye
Of sondry folk"—

the "house party" who formed the nucleus of our Club meetings in this ancient town—the oldest in England—which regards London as its younger sister.

An early start was made on the Friday morning (a few enthusiasts were already afoot and sightseeing before breakfast!) when Mr. Alderman Gurney Benham, F.S.A., who throughout the visit acted as a most admirable "guide, counsellor and friend," came to our Hotel to take charge of the party soon after 9 o'clock, and was introduced to the Members.

The proceedings commenced in glorious weather with a visit to Holy Trinity Church, and the monument therein to Dr. William Gilbert, the famous Elizabethan scientist, physician to Queen Elizabeth, and pioneer in the science of magnetism and electricity. Passing by Scheregate the company made their way to St. Botolph's Priory Church ruins which were seen to great advantage in the brilliant sunshine. Mr. Gurney Benham here gave an account of St. Botolph's Priory and its church, mentioning that the parochial church of St. Botolph existed before the Priory in Saxon times and that in connection with it was a community of priests. About the year 1093 this community decided to form a priory for the Augustinian Order, and this foundation, the first of the Order in

this country, was given authority over all other houses of the Order in England. The rules of the Order were simple, and Mr. Benham mentioned the fact that one of their customs was that their "Rule," consisting of seven chapters, was read over weekly in their assembly hall, one chapter on each day in the week, whence the term "Chapter House" for their place of assembly. The revenues of the priory in early days were about £52 a year, and even at the value of money in those times it must have been a difficult matter to provide for the thirteen canons who formed the Priory at Colchester. At the Dissolution in 1536, the yearly value of the Priory was stated to be £134. All traces of the Priory buildings had been destroyed and nothing was left but the nave of the church, which being "parochial" had to be spared. The chancel, however, was destroyed and no trace of it remains.

This venerable ruin, a remarkable example of Norman workmanship with Roman materials, is now happily scheduled under the Ancient Monuments Act, and is evidently well-cared for by the Government Department concerned with its preservation.

From the Priory the visitors proceeded by the line of the old Roman Town Wall to the Castle Park. Here Councillor A. M. Jarmin, F.R.Hist.S., Deputy-Chairman of the Colchester Corporation Museum Committee, gave a most interesting description of the recently excavated foundations of a street of Roman houses, which existed on the upper promenade of the park where the bandstand is now placed. Mr. Jarmin referred to the discovery, during these excavations, of remains of yet older Roman buildings under the tessellated pavements and foundations, these older buildings showing distinct signs of having been consumed by fire, the theory being that they were the buildings destroyed by Boadicea in her devastation of the Roman Colony about A.D.60. The exterior of the Castle, built *circa* 1076 A.D. by Eudo Dapifer, or Chamberlain, to William the Conqueror, was next inspected, Mr. Jarmin describing the interesting features of the fortress. The dwarfed Sycamore tree, over a century old, growing on the summit of the Castle ruins, and said to have been planted to commemorate the Battle of Waterloo, attracted some attention from the visitors by reason of its stunted condition, due to its unfavourable position.

St. Helen's Chapel in Maidenburgh Street, a chapel served by the monks of St. John's Abbey in pre-Reformation days, afterwards used as a Friends' Meeting House, then as a school, a circulating library, a furniture store, and now (since 1886) restored to sanctity as a church house, for the clergy of the Rural Deanery, was next inspected.

The old house in West Stockwell Street, now converted into two residences (Nos. 11 and 12) in which resided the authoresses of "Twinkle, twinkle, little star," "My Mother," and other familiar nursery rhymes, bears a tablet on the facade:—

In these houses /
lived /
Jane and Ann Taylor /
Authors of Original Poems /
for Infant Minds, &c. /
1796—1811. /

From here the two sisters removed, in August, 1811, to Ongar.

After lunch a visit was paid to the Town Hall, and the visitors, taking advantage of the fine weather, ascended to the top of the tower, whence a fine view was enjoyed.

Proceeding from the Town Hall to the Castle a thorough inspection of the interior of that building was made. Mr. Gurney Benham, speaking in the quadrangle, gave a short account of the Castle and of its vicissitudes and various changes of control and ownership, culminating in its acquisition last year by the Colchester Town Council.

The prisons were visited, and the tale of martyrdom of the young Quaker, James Parnell, who died here as a prisoner in 1656, at the age of 18 years, was recounted.

The walls of the Castle were found to be covered with a number of wild plants, among which were recognized the following :—

Ranunculus bulbosus, *Malva sylvestris*, *Draba verna*, *Cheiranthus cheiri*, *Sedum acre*, *Silene Otites*,¹ *Medicago lupulina*, *Hypochaeris radicata*, *Taraxacum officinale*, *Veronica arvensis*, *Echium vulgare*, *Lolium perenne*, *Dactylis glomerata*, *Festuca ovina*.

Later in the season, of course, many more species would have been noted.

The recently opened-up "Romano-British Room" in the Castle (formerly the Castle Library) was utilized for the first time, and here the party was entertained at tea by the Chairman of the Museum Committee (Alderman Gurney Benham) and Mrs. Gurney Benham. Mr. Jarmin, Dr. Philip Laver, Counsellor H. Harris, Councillor Durrant, and other members of the Museum and Library Committees, were present, and the company also included the Mayor and Mayoress of Colchester (Mr. and Mrs. Arthur J. Lucking), the Town Clerk (Mr. H. C. Wanklyn), and Mrs. Wanklyn, Mr. A. G. Wright (curator of the Museum), Mr. George Rickword, F.R.Hist.S., etc.

After tea Mr. Jarmin gave an excellent account of the Museum exhibits and of their great interest as giving a continuous illustration of local history from prehistoric times to the nineteenth century, all periods being well represented, except perhaps the periods of Saxon and Danish rule, of which, for some reason, difficult to account for, few remains have been brought to light in Essex. The President, on behalf of the Club, expressed thanks to Mr. and Mrs. Gurney Benham for their hospitable entertainment and for all the arrangements made, also thanking Mr. Jarmin for his valuable co-operation and guidance.

The alteration made in the Museum by the addition of the room formerly the Castle Library elicited many expressions of approval as a very useful and desirable improvement.

After tea the visitors were shown the various objects of interest in the museum, Mr. A. G. Wright, Mr. Jarmin, Dr. Philip Laver, Mr. E. Laver, Mr. Duncan Clark, and the Chairman of the Committee (Alderman Benham) acting as guides.

On Saturday the visitors inspected the Colne Oyster Fishery, proceeding to Brightlingsea by rail and embarking there on the steam-dredger Pye-fleet, by permission of the Colne Fishery Board. Amongst those accom-

¹ For an account of the introduction of this plant to this station, see ESSEX NATURALIST, vol. i., 1887, p. 95.

panying the members of the Club were the Mayor of Colchester (Cr. Arthur J. Lucking,) Ald. Wilson Marriage (chairman of the Colne Fishery Board), Ald. Gurney Benham, Cr. Jarmin, Mr. Edgar Martin (a member of the Board), and Mr. G. L. Russell (manager), who superintended the arrangements.

The Pyefleet steamed down to Colne Point, thus affording to the visitors a fine view of the estuary ; then, turning up-stream, dredges were put down and a heterogeneous assemblage of oysters, *Crepidula fornicata* in only too great profusion, starfishes, sunstars, ascidians, etc., soon littered the decks. The visitors were told that the past oyster season had been a poor one, and indeed scarcely a dozen living oysters were brought up by the dredges.

At Peewit Island, in the Pyefleet Channel, the visitors went ashore, and found a capital lunch awaiting them in the Fishery Board's Packing Shed, provisions having been sent in advance from the Anchor Hotel at Brightlingsea.

After lunch the President referred to the honour paid to the Club by the presence of the Mayor of Colchester, who was their guest on the occasion, together with Mr. Alderman Marriage and the officials of the Colne Fishery Board. In reply, the Mayor thanked the President for his kindly welcome and for the hospitality shown him. Alderman Marriage supplemented his worship's remarks, and remarked humorously that he "hoped we should be able to send a good order for oysters."

Some excitement was created by a high spring-tide, which invaded the Packing Shed, and covered the whole island, condemning the party to remain prisoners for an hour or more ; this enforced interval of idleness was utilized by several irrepressible individuals to be rowed over to Mersea Island, where a large number of coots was seen and some immature golden-eyes on a large mere. Other birds observed during the voyage on the Colne were black-headed gull, herring gull, cormorant, shelduck, mallard, curlew, redshank, lapwing, dunlin, ring plover, heron, and moorhen.

In mid-afternoon the party re-embarked on the dredger and returned to Brightlingsea, where it arrived in a somewhat numbed condition from the cold wind which had arisen during the day ; however, warm fires and a substantial tea at the Anchor Hotel quickly restored the circulation and revived the spirits of the visitors, and, after a ramble through the shipbuilding yard, the return journey was made to Colchester.

In the evening, a reception was held at the Town Hall by the Mayor and Mayoress, when, in addition to the members of the Club, the guests included the Deputy-Mayor (Mr. A. Owen Ward), and various members of the Town Council. The borough regalia were exhibited and were described in detail by Alderman W. Gurney Benham. The objects exhibited included :—

The mace, made in the 18th century (A.D. 1730) by melting up various earlier silver cups and other vessels ; its weight is 17lbs. 30zs. troy, or 12lbs. avoirdupois.

The Mayor's chain of office, which was presented by a quaker to a former quaker-mayor.

The Mayor's theatre-ticket (date 1750), which afforded the holder free ingress to the borough theatre.



Photo by J. Dudley Daymond.

ESSEX FIELD CLUB PARTY AT ST. JOHN'S ABBEY GATEWAY, COLCHESTER, MARCH 27, 1921.

Left to right :—Miss Gander, Miss Gullick, Miss Walker, Miss G. Lister, Mrs. Hicks, Mrs. Thompson, Mrs. Whitwell (behind last), Miss Wyness, Miss Evitt, Mrs. Scourfield, Miss I. Lister, D. J. Scourfield, F. J. Lushey, Ald. W. Gurney Benham, C. Whitwell, Percy Thompson (*Hon. Sec.*), H. Batchelor, R. Paulson (*President*), Miss Barbour, Mrs. Paulson, Miss Smith, Miss Noel, Miss Gordon, Councillor Jarmin, Miss Bray, Miss Mathias, A. J. Nunn.

The four ward maces, *circa* Charles I., which were carried by the four sergeants of the town.

A silver oyster, date 1804, used by the Water Bailiff to regulate the size of saleable oysters.

Two silver oars, the insignia of the town's Water Bailiff, one of them of date 1804-5, the other 1827.

A silver-gilt loving-cup, date 1673, formerly used at the election of the Mayor.

A silver salver, date 1844.

The key of the Town Hall.

Snuffboxes, which formerly went the rounds at mayoral dinners.

The "Newell" Cup, date 1813-14.

Two silver communion cups.

The chain worn by the Mayoress, which was a relic of the Pageant of 1909; each succeeding holder adds an extra link to the chain.

A beautifully executed silver sailing-vessel.

Some silver dishes and a cup, made of medals gained by Colchester rosarians and presented to the town.

The silver seal of the Corporation *circa* 1320.

A tie-pin, having in its centre a veritable pearl, which was found in a Colchester oyster.

Lastly, the key used in opening the first of the houses just erected under the Corporation's housing scheme.

Coffee and refreshments were served to the guests after the exhibition, following which the President expressed the thanks of the party to the Mayor and Mayoress for their kindly hospitality, saying that the Club had visited Colchester on several previous occasions, but that the welcome extended on the present occasion exceeded even that formerly shown.

The Mayor, in reply, expressed the pleasure he had felt in joining the Club's excursion that day, and hoped that this would not be the last occasion upon which the Club would visit Colchester.

On Sunday visits were paid to Tymperleys (in Trinity Street), St. Giles's Church, St. John's Abbey Gateway and thence to the Balcerne Gateway, where Mr. Philip Laver, F.S.A., gave a very interesting address, illustrated by plans and maps, on the Roman Town Wall, the Balcerne and other gateways, and the general configuration of Colchester and its roadways in Roman times. The west and north walls of the town were afterwards inspected. Mr. Philip Laver, Mr. Gurney Benham and Mr. A. M. Jarmin acted as guides.

In the afternoon a visit was paid to the Public Library to inspect the Harsnett Library, where Mr. George Rickword, F.R.Hist.S., read a paper on Archbishop Harsnett and his library (printed in full *ante*). Mr. Rickword's paper was of exceptional interest and included much matter not generally known concerning this distinguished Colcestrian.

Alderman Benham, as Chairman of the Library Committee, thanked Mr. Rickword for his valuable contribution to local history, remarking that no other man in Essex, and probably no one outside the county, could have given so full and so interesting an account, which was evidently the result of long study and research and of special knowledge and thought.

Subsequently a visit was paid to the Siege House, East Mills, where the

visitors were received by Alderman Wilson Marriage, who described the interesting features and contents of this Tudor building.

In thanking Alderman Marriage, Mr. Gurney Benham remarked on the indebtedness of Colchester to Mr. Marriage for his public spirit in having restored and preserved, so carefully and effectively, the Siege House premises. Mr. Benham also remarked on the interest of the East Mills, observing that the business of which Mr. Marriage was head was almost unique in point of antiquity. Some London businesses boasted of being established over fifty or a hundred years. The East Mills at Colchester had been established *over a thousand years* and had carried on business continuously since Saxon times and possibly even from earlier days.

Mr. Jarmin also remarked on the historic interest of the mills, which, as he observed, had not been overlooked in the Colchester Pageant of 1909.

The President thanked Alderman Marriage for his kind reception of the party.

Some considerable interest was manifested by members of the party in a small pencil sketch by Constable, of the East Bridge, Colchester, in Alderman Marriage's possession. Above the sketch is faintly written in pencil: "East Bridge Colchester July 27 J.C.," and the back bears an endorsement by the present owner, stating that the sketch was originally in Miss Isabel Constable's collection and afterwards in that of his brother, Edward Burgess Marriage, who sent it to Alderman Marriage in 1912.

On Monday morning a brief visit was paid to St. Martin's church, Colchester, where Mr. George Rickword, F.R.Hist.S., gave a careful and interesting account of the ancient structure.

At 10 a.m. the party proceeded by char-a-banc to Dedham, where they were met by Canon Rendall, Litt.D., of Dedham House.

The Dedham visit commenced with a description by Canon Rendall of the "Square," the old market-place at Dedham, its present houses and its previous configuration.

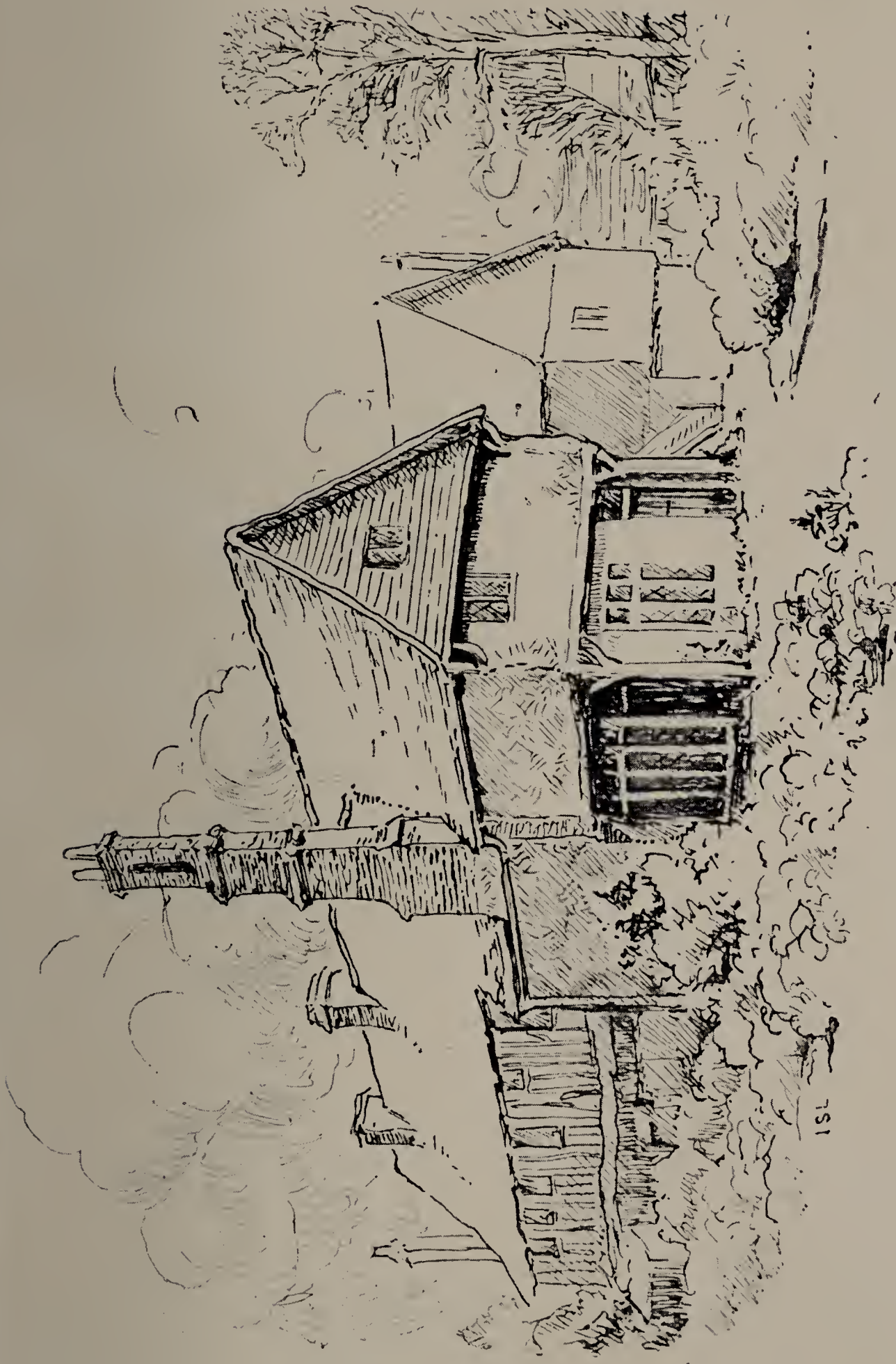
The interesting and ancient bay and say trade weaving factory—now a group of cottages—was next visited and the original design and uses of this typical specimen of an early "factory" were described and illustrated by Dr. Rendall in a lucid and interesting manner.

The party spent a long while examining, under Canon Rendall's guidance, the handsome and in many ways remarkable parish church of Dedham. The details of the late Perpendicular architecture of the church were described, and the "Easter Sepulchre" tomb, often inappropriately called "the founder's tomb," was also examined and elucidated. The notable sculptured portrait monument of the famous 17th century preacher, John Rogers, in the chancel is one of the most interesting objects in Dedham Church :

Here John Rogers waits expecting,

That which he preached, the Resurrecting.

Of him Dr. Rendall gave a picturesque account, mentioning how his early morning discourses or "lectures" in Dedham church from 8 to 9 a.m. on Tuesdays (the market day), attracted crowded congregations, numbering at least 1,200, men arriving there on horseback from Ipswich and other towns in the neighbourhood, and even from Cambridge.



THE OLD BAY AND SAY MILL, DEDHAM.

From a pen-and-ink sketch by Miss I. Lister, 28-3-1921.

After luncheon at the Marlborough Head, the party proceeded to East Bergholt church, inspecting there the baptismal register, with its record of John Constable, in 1776.

The entry reads :—

“ Born 11 John son of Golding and Anne Constable/”

The probable explanation of this unusual record of the birth is that the infant was considered as not likely to live, and was accordingly baptized privately on the same day as his birth.

The parish registers of East Bergholt presented other records of interest to the cryptogamic botanists of the party in the signatures of Dr. Badham (1806-57), the fungologist (after whom the myxomycete, *Badhamia*, received its name). Badham was curate to the Rev. Joshua Rowley at East Bergholt, and between the dates 1849 and 1855 his signature as officiating priest at marriages and burials occurs frequently. His own burial is also recorded here :—“ Charles David Badham, buried July 18th 1857 age 51.” He died at Oxford on July 14th.

The visitors were received at East Bergholt church by the Rector (Rev. T. F. Paterson) who supplemented Canon Rendall's interesting account of this church with various items of information. East Bergholt church abounds in curious epitaphs, including one :

In Memory of Mr. JOHN MATTINSON, born in Long Sleddale, near Kendale, Westmoreland. He was Eleven years the Beloved School Master of this Town, and then Unfortunatly Shott, the 23 November, 1723, aged 32.

Profuit et placuit. Miscebat et utile dulci, Discipulis terror, deliciæque suis.

Also the rather puzzling alliterative addendum on Edward Lambe's sumptuous memorial (Nov. 19, 1647) :

Lambe Lived Laudably Lord Lett Like
Life Learne Ledede Livers Lament.

As Dr. Rendall remarked, the writer seemed to have lost himself in the “ l's.” “ Ledede ” has been construed as meaning “ lewd,” the word “ learne ” being taken as meaning “ teach.” Edward Lambe was a learned Lawyer (which the alliterationist overlooked) and as his epitaph states :

With his counsell he helped many,
Yet he took fees scarce of any.

A relic, which attracted special attention, was a German bomb which is now hung in the church, with a brass plate below it with this inscription :

THIS BOMB IS ONE OF 40 OR MORE DROPPED
ON OUR PARISH BY A GERMAN AIR-SHIP,
SEPT. 12, 1915, YET NO ONE INJURED. THANK
GOD.

In the churchyard we noticed the tomb of “ William Lott, of Gibeons Farm, near Flatford Mill, in this parish,” who died in 1849, aged 88 years. Constable's artistic genius has immortalized “ Willy Lott's House,” and with it its otherwise unknown occupier.

From East Bergholt church the Club proceeded to Flatford, where Canon Rendall showed the interesting and well-restored Constable bridge,

the often-painted lock and mill, Willy Lott's House (now sadly dilapidated), the Valley Farmhouse, and the ancient and somewhat mysterious moated area near by, believed to be a relic of Danish or Saxon, or perhaps even earlier times, but like the similar moated enclosure at Chigwell, without a history!

Tea was partaken of at Flatford, in the picturesque cottage adjoining the bridge, the party including Canon Russell, of Dedham, one of the original members of the Club, who forty-one years ago, when rector of Chingford, was present at the inaugural meeting of the Club, held on January 10, 1880, at Buckhurst Hill.

The President referred with satisfaction to Canon Russell's presence, and Canon Russell in a few words, expressed his continued interest in the Club and recalled its important services in earlier days in securing the preservation and proper maintenance of Epping Forest.

The President also thanked Canon Rendall for his kindness in acting as guide and expositor during the day, and for the way in which he had delighted the whole party with information of great interest. Mr. Paulson also, on behalf of the Club, tendered their warm thanks to Mr. Gurney Benham for arranging the whole of their programme and for accompanying them throughout and adding to their enjoyment of all that they had seen during a most delightful expedition. Mr. Paulson further expressed the Club's acknowledgments to the Mayor of Colchester, Mr. Jarmin, Mr. Wilson Marriage, Mr. Philip Laver, Mr. A. G. Wright, Mr. Rickword and other gentlemen of Colchester who had so kindly helped the Club and given it a welcome.

Canon Rendall and Mr. Benham suitably responded.

A visit was afterwards paid to Stratford St. Mary' Church, and the party then returned, via Boxted, to Colchester Railway Station, thus ending an Easter excursion which was voted by the members one of their most successful and memorable expeditions.

Six members of the party remained at Colchester until the following day (Tuesday), and had the opportunity, by the kindness of Alderman Wilson Marriage, of inspecting the East Mills, where the various processes of "breaking down" the grain, separating the flour from the bran, and grading the flour, were explained to them in detail.

[In compiling the above account, the Editor wishes to record his indebtedness to the excellent report of the Colchester meeting, which appeared in the *Essex County Standard* of April 2nd, 1921.]

ORDINARY MEETING (528th Meeting) and ANNUAL MEETING (529th Meeting).

SATURDAY, 2ND APRIL, 1921.

These meetings were held in the Physical Lecture Theatre of the Municipal Technical Institute, Romford Road, Stratford, the President, Mr. Robert Paulson, F.L.S., F.R.M.S., in the chair. 33 members attended.

The following were elected members of the Club, viz. :—

Mr. J. Dudley Daymond, of 7, *Edward Street, Vincent Square, S.W. 1.*

Mr. E. Traherne Drummond, of "*Wyaston*," *Woodford Green*.

Mr. A. W. Frost, of 54, *North Hill, Colchester*.

Mr. Percy W. Horn, Curator, Stepney Borough Museum, 77, *White-chapel High Street, E. 1*.

Miss Ruth Walker, of 63, *Denbigh Street, South Belgravia, S.W. 1*.

Mr. Percy Thompson exhibited a fine "pellet" of white-tailed eagle, from the Derwent Valley, which had been presented to the Museum by Mr. F. J. Stubbs; and also some "pellets" of jackdaw, obtained in the tower of Dedham Church, Essex, on the occasion of the Club's visit on Easter Monday.

Mr. Walter Fox exhibited and described three sections (longitudinal, diagonal, and transverse) of the trunk of the "Cricket-bat Willow" (*Salix alba, var. caerulea*), which he had presented to the Club's Museum. These sections, cut from a tree which had been planted as a "set" by Mr. Fox himself, only seven years before, had already attained a girth of 30 inches at the base of the trunk, a remarkable instance of the value of care in planting, staking and protecting from drying winds and undue heat. Mr. Fox also showed a "set" cut for a cricket-bat, and described the *modus operandi*.

Mr. D. J. Scourfield exhibited a living specimen of the medusiform larva of the hydrozoan *Aurelia aurita*, taken in the Colne Estuary on the occasion of the Club's excursion a week before.

Mr. Avery exhibited a series of old prints of Colchester from his private collection.

The thanks of the meeting were voted to the several exhibitors and donors.

The business of the annual meeting was then taken.

The Minutes of the last annual meeting were read and confirmed.

The Hon. Treasurer presented his statement of the Club's accounts for the year ending December 31st, 1920, and moved formally that they be received and adopted. Mr. F. J. Brand seconded. The motion on being put to the meeting, was carried *nem. con.*

The Hon. Secretary read the report of the Council on the work and progress of the Club during the past year. On the motion of Mr. C. Whitwell, seconded by Mr. Thorrington, the report was adopted *nem. con.*

No nominations having been handed in other than those made at the meeting held on 26th February last, the President formally declared the persons then nominated to be duly elected as new Members of Council and Officers for the ensuing year, as follow:—

As President, Mr. Robert Paulson, F.L.S., F.R.M.S.

As New Members of Council, Mrs. A. M. Thompson, Miss A. Hibbert-Ware, F.L.S., Sir Robert Armstrong-Jones, F.S.A., Mr. C. Nicholson, F.E.S.

As Hon. Treasurer, Mr. John Avery, F.C.A.

As Hon. Librarian, Mr. F. J. Brand.

As Hon. Secretaries, Messrs. W. Cole, A.L.S., and Percy Thompson, F.L.S.

As Hon. Editor, Mr. Percy Thompson, F.L.S., assisted by Mr. Henry Whitehead, B.Sc.

As Auditors, for 1921-22, Messrs. C. Nicholson, F.E.S., and C. Bestow.

On the motion of Mr. Whitwell, seconded by Mr. Nicholson, the members of the Cole Pension Committee were re-appointed for the ensuing year.

The President then delivered his Presidential address "Ten Years' Progress in Lichenology in the British Isles," which he illustrated by a series of lantern photographs and by the exhibition of specimens of various lichens.

At the conclusion of an interesting address, Mr. Percy Thompson eulogized the work of the President in throwing new light upon the relationship which subsists between the algal and fungal components of the lichen-plant; and moved that the best thanks of the Club be accorded to the President for his address, and that he be requested to allow it to be published in the Club's journal. Miss A. Lorrain Smith, in seconding the motion, paid a tribute to Mr. Paulson's valuable work in lichenology, and, on being put to the meeting, the motion was carried by acclamation.

The President, in reply, thanked the Members for their cordial reception of his address, and expressed his willingness to allow it to be published.

The Meeting then terminated.

NOTES : ORIGINAL AND SELECTED.

Æneas MacIntyre : A Forgotten Essex Botanist—Mr. James Britten, in the *Journal of Botany* for June 1921 (p. 176) gives, under the heading of "Bibliographical Notes," further particulars concerning this individual, as to whom Mr. Miller Christy was recently enquiring.¹

Mr. M. E. Hughes-Hughes also offers [*in litt.*] some additional information. He states that his father was sent at the age of 5½ years (in 1823 or 1824), to the large boarding school, kept by MacIntyre, which is mentioned by Mr. Britten. Mr. Hughes-Hughes observes, "I fancy that it was not a successful venture, for I have some recollection of my father saying that *his* father helped to finance him"; and he relates how MacIntyre presented medals, in a progressive series, to his pupils as rewards of merit. MacIntyre's son, of the same name as himself, was not unnaturally more beloved of his parents than of his fellow pupils; he is believed to have studied for the Bar, and to have become a Q.C. in maturer years.

In the *Journal of Botany* for July 1921 (p. 204), Dr. B. Daydon Jackson and Mr. Spencer Moore add some further particulars of this botanist. The latter gives evidence which is confirmatory of Mr. Hughes-Hughes' statements, but points out that MacIntyre's school was not at Stockwell Park, as believed by Mr. Miller Christy, but at Streatham Common.

In 1840 MacIntyre was residing at West Ham, according to the rate-book of that year, in a small house in Vicarage Lane, of the rental value of £20 and rateable value £16.—ED.

Snow-Goose at Harlow.—"A.H.G." states (*Field*, January 29, 1921, p. 126), that, during a storm on January 10, 1921, a Snow-Goose came down to the water at Barrington Hall, Harlow, and stayed four days. It accompanied some Canada Geese which live there, and was noticed to be a good deal smaller than these birds. (*British Birds*, xiv., May 1921, p. 282.)

¹ See *ante*, p. 267.

ESSEX FIELD CLUB.

REPORT OF THE COUNCIL FOR 1920—21, PRESENTED TO THE ANNUAL MEETING ON APRIL 2ND, 1921.

LADIES AND GENTLEMEN,

Throughout the past year steady progress has been made in the various activities of the Club, and the interest of Members has been well maintained. The membership of the Club now stands at 320, comprising 18 honorary, and 302 ordinary Members.

The attendance at the Stratford Meetings has been exceptionally good, ranging from 42 to 80 on each occasion, the average attendance being 59.

Seven day field meetings or visits to Museums have been held, with an average attendance of 48. We have to thank our members, Mr. and Mrs. A. E. Briscoe, for kind hospitality shown on the occasion of the excursion to Danbury and Little Baddow. In addition, two five-day meetings at Cambridge and at Colchester respectively, have been held since our last annual meeting.

Considerable accessions have been made to the collections in the Club's Stratford Museum, both by purchase and by gifts from friends. Within the last few weeks a collection of some 270 lichens has been donated to the Museum by the Trustees of the British Museum, and these specimens, together with others recently acquired, have all been remounted on herbarium sheets and arranged, and are now available for the use of students of the Class.

During the past year series-collections of insects (Lepidoptera, Hymenoptera, Orthoptera, Neuroptera and Diptera) have been arranged for the use of students. Two of our Members are engaged in forming a collection of Essex Coleoptera for the Museum, and have made considerable headway in this work.

The exhibits of living wild flowers have been maintained without a break throughout the year, and are much appreciated by visitors to the Museum.

A small marine aquarium has been kept going through the year, thanks to the energy and care of one of our Members, Mr. F. J. Lambert, to whom the Council desires to record its thanks.

The Club's Library has grown steadily during the year, over 300 volumes having been added during that time, and now comprises some 4,350 bound volumes, in addition to unbound parts and pamphlets. Additional shelving has been necessitated to accommodate the influx of books.

Considerable progress has been made in mounting the views forming the Pictorial Survey of the County, and selections from these views are on constant exhibition in the Museum and form an attraction to visitors. Miss Greaves is to be congratulated on her success in displaying these.

The Council has to announce with regret that Mr. H. Whitehead, the curator's assistant, has resigned on taking up a new appointment at Leeds, and wishes to record its appreciation of Mr. Whitehead's able and painstaking work during the twenty years of his connection with the Museum.

As regards the Forest Museum at Chingford, Mr. Brand has been obliged, owing to removal from the neighbourhood, to resign his curatorial work there, and Miss Oxley has kindly undertaken the care of the wild-flower exhibits in succession to Mr. Brand. The best thanks of the Club are due to both Mr. Brand and Miss Oxley for their services.

Two 64 page parts of the Club's journal have been issued during the year. The great increase in the cost of printing and postage has led your Council to consider the advisability of recommending an increase of the annual subscription from Members, but no proposals are yet ripe to lay before you.

During last summer your Council took public action with regard to threatened enclosures of Forest land in the interests of permanent allotments, by memorialising the City Corporation, as well as by inviting the co-operation of many kindred scientific societies in protesting against a contemplated interference with the provisions of the Epping Forest Act of 1878. Your Council is happy to report that, largely on account of this action, the enclosures have been abandoned, and the Forest land restored to its statutory purpose "as an open space for the recreation and enjoyment of the public."

NOTES: ORIGINAL AND SELECTED.

Bittern Shot at Maldon.—The first bittern seen in the Maldon, Essex, district for 30 years has been shot by a naval officer and presented to the Maldon Town Council, which will preserve it in the council chamber.—*Daily Mail*, May 23, 1921.

Commenting on the above outrage, Mr. "Punch," in his issue of June 8th, 1921, adds "It is hoped that the naval officer also may be stuffed and kept in an adjoining case." And what are the Maldon authorities doing to enforce the Wild Birds Protection Acts?—ED.

Badgers near Saffron Walden.—During the spring of 1920 a couple of badgers took up their residence in a burrow in a plantation near the town. They were discovered, dug out and killed. It is a pity that these shy and inoffensive creatures cannot be left in peace when they appear in our Essex woodlands. It says much for their shy and nocturnal habits that they have managed to escape extinction in the county.—GEORGE MORRIS, B.Sc.

Mammoth Remains at Little Chesterford.—During the past two years remains of the Mammoth (*Elephas primigenius*) have been obtained in the terrace gravels of the Bordeaux pit. A pelvis of an adult specimen was uncovered, but was in too fragile a state to be preserved; a photograph of the bone *in situ* was obtained. During this spring (1921) several molar teeth and the fragments of a tusk were obtained.—GEORGE MORRIS, B.Sc.

Polished Neolithic Celts from Chiswick Hall Farm, Duddenhoe End.—During the past few years the tenant of this farm has ob-

tained from a small area on his land an interesting series of Neolithic implements. These include two polished celts, two unpolished adzes, several finely-worked scrapers, and a large number of flakes and implements of a rougher type. The site of these was visited by the Essex Field Club in 1912, at which date it was in a derelict state. It is situated on the highest part of the Essex upland, on a stiff boulder clay soil, which must have been covered with forest in Neolithic times. The discovery of flint implements on such a site is unusual and is of extreme interest.—GEORGE MORRIS, B.Sc.

Eastbury House, Barking.—It is with much satisfaction that we learn, from the *Report* of the National Trust for 1920-21, issued last July, that the entire cost of purchase and renovation of this fine old Elizabethan manor house has now been defrayed. The building has been put into a habitable condition, and it is intended to utilize it as club premises for the ex-Service men of Barking.—ED.

Ecological Studies on *Paludetrina ulvæ* and *P. ventrosa* in Essex.—Mr. G. C. Robson contributes an interesting article to the *Annals and Magazine of Natural History*² on his researches on the distribution of two species of common brackish-water gastropods in tidal ditches to the west of Leigh-on-Sea.

Some of these ditches receive frequent supplies of sea-water, whilst others are more or less cut off; the consequence being a considerable variation in the salinity of the water in various ditches. Investigation showed that *P. ventrosa* is more adaptable than *P. ulvæ*. It was at first thought that the degree of salinity might be the chief factor in determining the distribution of *P. ulvæ*; it was found, however, that this species was practically confined to ditches containing the alga, *Ulva lactuca*, which in this district appears to be the favourite food-plant of this gastropod, stragglers only being found on *Enteromorpha* and *Schlerochroa*. In other districts *P. ulvæ* has been found plentifully on *Enteromorpha* and *Zostera*, but the former plant does not apparently appeal to the palate of Essex examples although it occurs plentifully in the Leigh ditches.—HENRY WHITEHEAD, B.Sc.

Roller at Ramsey.—A specimen of the Roller (*Coracias garrulus* L.) was captured alive in an exhausted condition after having "telegraphed" itself at Ramsey, near Harwich, on 17 June, 1921; a second example is reported to have been seen at the same time.

The captured bird was brought to our Member, Mr. W. B. Nichols, of Bradfield, Manningtree, but soon succumbed; and Mr. Nichols has very kindly had the specimen set up and has presented it to the Club's Museum at Stratford.

This is believed to be only the second authenticated record of the occurrence of this rare straggler in our County. Miller Christy, in his "Birds of Essex" (p. 150) refers to an example, shot at Great Chesterford in 1865, and now in the Saffron Walden Museum, as being the only county record known to him.—PERCY THOMPSON.

² Observations on the Succession of the Gastropods, *Paludetrina ulvæ* and *ventrosa*, in Brackish Water." *Ann. and Mag. Nat. Hist.*, Series 9, vol. vi. (1920), pp. 525-529.

Freshwater Prawns at Benfleet.—Students of the Crustacea are well aware that both in Europe and in North America individual species of the genus *Palæmonetes* occur occasionally in fresh water as well as in brackish water and in the sea. A visit, in August, 1921, to a pond on Kersey Marsh, near South Benfleet, showed that numbers of a common prawn, *Palæmonetes varians* Leach, were present in perfectly fresh water, at which horses were seen to drink and of which the remaining flora and fauna were distinctly of fresh-water *facies*. *Potamogeton pectinatus* in fruit, and a submerged batrachian *Ranunculus*, were the only phanerogams observable in the pond, the water of which was tasteless, clear and deep, with a muddy bottom. Pond-skaters, a water-vole, and a common frog, gave additional testimony to its fresh-water character, and subsequent examination under the microscope of an evaporated drop of the water showed the merest trace of salt-crystals.

The pond had evidently been cut off from any connection with tidal waters for a long time ; enquiry elicited that the last time the marsh was flooded was in or about 1907, during an exceptionally high tide, upon which occasion doubtless the prawns were introduced from the sea, and since when the water in the pond has been gradually becoming less saline, until now it is quite fresh. The same species of *Palæmonetes* occurred numerously in brackish ditches at Leigh and in the open sea at the same place.

Specimens of the prawns, which are not at all dwarfed by their residence in fresh water, have been preserved in the Club's Museum.—PERCY THOMPSON.

End of Vol. XIX.

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PUBLICATIONS of the ESSEX FIELD CLUB.

The specially-valuable feature of the Publications of the Club is that they are almost wholly local in character. The volumes (comprising over 6,000 pages) contain hundreds of papers on the Natural History, Geology, and Pre-historic Archæology of Essex. The articles are of the greatest interest to all persons having any regard for the County, and the scientific accuracy and detail of a large proportion of them make them of value also to students of the subjects named living elsewhere.

The publications are all of demy octavo size. Nearly all contain numerous illustrations, in addition to plates. All are still in print, but some are becoming *very rare*.

“ TRANSACTIONS ” and “ PROCEEDINGS ” (in parts).

This series, which ran from 1881 to 1886, is no longer published, having been superseded by the *Essex Naturalist* (see below).

Volume.	Date.	Pages.	Plates.	Price.	Complete Set.
Volume I	1881	lxxv + iio	—	£ s. d. *	By special arrange- ment.
“ II	1882	xcı + xxx + 196	6 *	
“ III	1884	civ + viii + xlii + xxiv + 236	4	0 16 0	
“ IV (Trans.)	1886	vii + 228	1	0 8 0	
“ IV (Proc.)	1892	ccxix + vii + lx	—	0 9 6	

* Volumes I and II of the “ Transactions ” can be supplied *only with complete sets*, of which but few are in hand.

“ THE ESSEX NATURALIST ” (in parts).

This publication (of which the nineteenth volume is now completed) has been since 1887 the official organ of the Club. In it are published all the scientific papers read before meetings of the Club, reports of meetings, contributed notes, &c.

Volume.	Date.	Pages.	Plates.	Price.	Complete Set.
Volume I	1887	viii + 280	5	£ s. d.	By special arrange- ment only.
“ II	1888	xii + 272	2	
“ III	1889	x + 296	—	
“ IV	1890	viii + 264	—	
“ V	1891	viii + 264	5	
“ VI	1892	viii + 208	1	
“ VII	1893	viii + 200	1	
“ VIII	1894	viii + 218	—	
“ IX	1895-6	xii + 264	1	
“ X	1897-8	xii + 416	2	
“ XI	1899-1900	xi + 370	9	0 14 0	
“ XII	1901-2	xii + 288	9	0 10 6	
“ XIII	1903-4	xii + 268	13	0 15 0	
“ XIV	1905-7	xii + 280	32	0 15 0	
“ XV	1908-10	x + 288	5	0 15 0	
“ XVI	1910-12	xii + 332	19	0 15 0	
“ XVII	1912-14	x + 292	19	0 15 0	
“ XVIII	1915-18	viii + 321	9	0 15 0	
“ XIX	1918-21	ix + 328	28	1 12 6	

Volumes I to X, now rare, are supplied on special application only, at the discretion, of, and at prices fixed by, the Council of the Club.

For continuation see over.

PUBLICATIONS OF THE ESSEX FIELD CLUB (continue 1)

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